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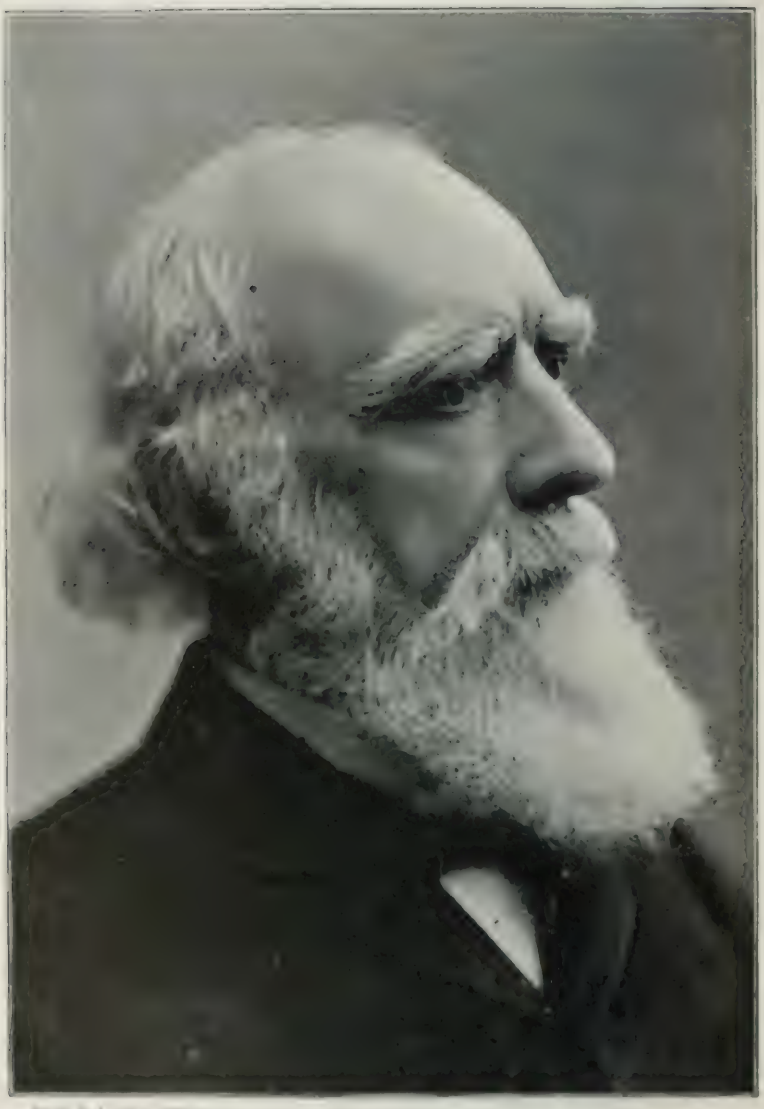
THE SELKIRK RANGE



Lord Strathcona

Can
Canada. Topographical Survey
Bulletin, no. 15.1

THE SELKIRK RANGE

BY

A. O. WHEELER, F.R.G.S.

VOL. I.

67406
22/12/05

OTTAWA
GOVERNMENT PRINTING BUREAU
1905

PUBLISHED BY THE DEPARTMENT OF THE INTERIOR
1905

To the Honourable Clifford Sifton, K.C.,
Minister of the Interior,
Ottawa, Ont.

Sir,—I have the honour to submit the following account of a topographical survey of the portion of the Selkirk mountains adjacent to the line of the Canadian Pacific railway.

It is accompanied by a brief review of travel and exploration, of previous surveys and of mountaineering in these regions.

In the Appendix will be found :—Notes on the zoology, ornithology and botany by Professor John Macoun, Dominion Naturalist and Botanist; on the climatology by R. F. Stupart, Director of the Meteorological Bureau; extracts from a note on the geological structure of the Selkirk range by the late Dr. George M. Dawson, Director of the Geological Survey of Canada; elevations along the line of railway referred to sea-level, accompanied by a profile, compiled by James White, Geographer to the Department; a technical description of the railway through the range by H. B. Muckleston, one of the company's engineers; an account by A. L. Rogers of the finding of Rogers pass by Major Rogers; and other matters of interest to the subject in hand.

Two seasons have been spent upon the work, and it is hoped that the accompanying topographical map will fill all present requirements. The ground has been covered between Beaver mouth and Revelstoke, from the eastern to the western slopes of the range.

At the latter point, a connection is made with J. J. McArthur's topographical survey of the Columbia valley and

Arrow lakes. By this means, a continuous zone has been topographically surveyed for some miles on either side of the railway and river, forming a base from which the work can be expanded in any required direction.

During the second year, the survey was extended southward to embrace all previous travel and exploration of the higher Selkirk summits and to enable a reliable guide map to be furnished to tourists and mountaineers.

Owing to the great influx to our Canadian Alps, from all parts of the world, of those interested in mountains and mountain scenery, the subject has become one of great interest. Accurate maps and reliable information are frequently asked for, and on this account, if no other, the accompanying notes may be of use.

Respectfully submitted,

ARTHUR O. WHEELER,

Topographer
Department of the Interior

NOTE.

The maps, diagrams, and plates accompanying this volume will be found in a separate pocket (Volume II.)

ACKNOWLEDGMENTS

First, I desire to acknowledge the excellent service rendered in the field by my assistants, Mr. H. G. Wheeler and Mr. M. P. Bridgeland, B.A., who were my companions on many a dangerous climb, under all conditions of weather; also their steady attention to duty while preparing the maps and tables accompanying this report, a somewhat tedious operation.

Next, I beg to thank most heartily those gentlemen whose names appear under articles in the appendices hereto, written by them on matters of interest pertaining to the Selkirk mountains; also the following persons who have kindly contributed information embraced in the text, viz.: Professor John Macoun, Mr. Walter Moberly, Mr. W. S. Gore, Mr. W. F. King, Mr. A. H. Whitcher, Mrs. J. M. Young, Mr. Richard Hunter, Mrs. Dr. Macdonald and Mr. H. A. Perley.

For illustrations, in addition to my own, I am deeply indebted to those whose names appear below the prints; also to the following, who have kindly supplied me with photographs for the accompanying portraits:—Mrs. Charles Schäffer (photograph of Sir James Hector), Mrs. Frank Moberly and Mrs. M. G. Kimball, niece of Major Rogers.

Lastly, I wish to acknowledge most gratefully the excellent work done by Mr. W. McMahon, Superintendent of Printing to the Department of Public Printing and Stationery, and his able staff in the publication of this report. No pains have been spared to bring it out in good form, and it is entirely due to their efforts that the publication appears in the present acceptable manner.

A. O. W.

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ERRATA.

Page 109, line 2: for South branch read North branch.

Page 230, line 5: for Oswyns read Oswyns.

Page 275, line 29: for Mt. Oden read Mt. Odin.

Page 285, line 2: for necessaires read necessaries.

Page 287, line 23: for from read form.

Page 311, line 20: for Corner Grat read Gorner Grat.

Page 364, line 28: for Broken Bow read Brocken Bow.

Page 408: Illustrations for Dupuse read Dippe.

Page 480, line 2: for West of Glacier House read East of Glacier House.

Page 398, line 35: for glandulifera read glandulifiorus.

Page 398, line 37: for tetragona read Mertensiana.

Page 398, line 42: for Douglasii read brevicaulis.

Pages 22, 28, 78 and 280, *insert*: "Courtesy of Detroit Photographic Co., 1902." should appear under each illustration.

PART I.

ACCOUNT OF THE SURVEY

Photo. H. W. Gleason, Boston

MOUNTS CHEOPS, GRIZZLY AND SIFTON.

CHAPTER I.

OVER THE SELKIRKS.

MY previous surveys of this nature had been confined to the eastern slopes of the Rockies and the cretaceous area of the Crows Nest coal beds in southeastern British Columbia, practically among more or less timbered foothills, with an occasional climb to the alpine park lands of the higher summits. It was, therefore, with a thrill of satisfaction I realized, on reading my instructions, that the work lay among the biggest of the big fellows, and that I was to go into the heart of the Selkirks.

The latter read: to make a topographical survey of the Selkirk mountains adjacent to the line of the Canadian Pacific railway, paying most attention to that portion, in the vicinity of the summit, visited by tourists and mountain climbers during the summer months.

As a medium for making the survey, it was intended to use the photographic method introduced into Canada by Mr. E. Deville, Surveyor General of Dominion Lands. The method is eminently suited for topographical delineation of the present character. In mountain regions, where the season between snow and snow extends but little over three months, during which time alone the peaks can be climbed in safety, the ability to cover a large tract of country in a short time is of much importance.

Photography as applied to surveying was first experimented with in 1849 by Colonel H. Laussedat, member of the Institute of France and President of the Conservatoire National des Arts et Métiers. It has since been applied in Germany, Austria, Italy, Switzerland and the United States, but far more comprehensively in the Dominion of Canada, where a number of extensive topographical surveys have been carried on by its aid.

The general principle of the method may be stated briefly: The photographs are perspectives from which, by the inverse rules of perspective, the visible lines or points defining the topographical features, therein seen, may be projected on a ground plan. It is necessary that the features to be mapped be seen in, at least, two views taken from stations some distance apart and of which the position and elevation above a given datum, generally sea level, have been ascertained. A topographical map usually consists of contour lines, which represent the projection on the plan of imaginary lines following the inequalities of the surface at given intervals of altitude. A sufficient number of points are determined from the photographs to

enable an accurate delineation, within the scale of the map, to be made upon the plan. The elevations of the points so determined are proportional to their altitude above or below a horizontal plane passing through the camera station and their distance from such station, and can readily be obtained from the photographs. They permit the contour lines to be drawn at any suitable equi-distance. The position and relative elevation of the camera station are ascertained by the ordinary methods of a trigonometric survey, carried to a greater or less degree of refinement. The accuracy and detail of the mapping is dependent upon the precision of the base work, the number of the camera stations and the scale of the map. The method is very similar to that of the plane-table, with the following exceptions: With the plane-table, much of the plotting is done in the field, with the camera, the same work is done in the office; with the plane-table you can occupy but one station at a time, with the camera, when plotting, you practically occupy both at once. You then have before you, at the same moment, the views taken at the two stations and thus see the ground simultaneously from both points of view. This is a very strong factor in the identification of points. On the other hand, the most perfect photographs are but a weak representation of nature's contrasts, and the delicate inflections of light and shadow are much impaired by transition through the camera lens and reproduction on the best of sensitised plates.

The degree of satisfaction caused by my instructions was somewhat diminished by more mature reflections. The difficulties encountered during the survey and construction of the Canadian Pacific railway, by the Rev. William Spotswood Green, F.R.G.S., by Messrs. Huber and Topham of the Swiss and English Alpine Clubs and by W. S. Drewry of the Canadian Topographical Surveys staff, all of whom had made surveys in the vicinity, acted as a damper upon the first feeling of exultation. They suggested the wisdom of a preliminary

excursion to spy out the land and ascertain the most suitable point for a start and the methods of transportation that should be employed. With these objects in view, it was decided to make a trip into the mountains and go over the ground on foot to become acquainted with the actual realities of the undertaking.

A short statement of the conditions leading up to the survey may not be amiss: By the terms of the Union under which the Crown Colony of British Columbia joined the Federated provinces of the Dominion of Canada (July 20, 1871), it was agreed that within two years from the date of the Union the Government of Canada should commence, simultaneously, the construction of a railway from the Pacific ocean towards the Rocky mountains and from a point selected east of the Rocky mountains towards the Pacific, to connect the seaboard of British Columbia with the railway system of Canada, and to secure the completion of such a railway within ten years from the date of the Union. On the other hand, the Government of British Columbia agreed to convey, in trust, to the Dominion Government, for the purpose of aiding the construction of the portion of the Canadian Pacific railway on the mainland of British Columbia, to be appropriated as the Dominion Government might deem advisable, a tract of land, not to exceed twenty miles on each side of the said line, provided that the line of railway referred to should be one continuous line connecting the seaboard of British Columbia with the Canadian Pacific railway then under construction on the east side of the Rocky mountains.

In addition to the administration of these lands, the mineral, timber and other franchises, a feature of much importance, involving a very considerable source of revenue to the country, had of late years sprung into existence. Nature, in one of her capricious moods, had laid the several passes, fated to be those selected for the transcontinental railway, through the wildest,

grandest and most attractive portions of the whole Rocky mountain system. It is only within the past two or three years that we are beginning to understand that, in this respect, we may aspire to rivalry with the European Alps and other mountain ranges of the world. I refer to the inflow of tourists, globe-trotters, hunters, sight-seers and bona fide mountain-climbers made possible by the construction of the railway. Some idea of the proportions this travel has assumed may be derived from an article in *Appalachia*, April, 1901, written by Prof. Chas. E. Fay, giving statistics gathered from the Register Book of Glacier House, the tourist headquarters at the summit of the Selkirks. The compilation was made while awaiting suitable weather to attempt the first ascent of Mt. Dawson. It shows that, between the years 1887 and 1898, no less than 12,000 guests stopped for at least a day at the hotel, many spending a considerable portion of the holidays there, making an average of 1,000 yearly. From 1898 to the close of 1902, the travel has been very much more extensive and the hotel has been taxed to its utmost, numbers during the past two seasons being turned away through lack of accommodation. In 1901, from the middle of March to the end of November, 1,261 names are registered. In 1902, from the end of January to the beginning of November, the register shows 1,873 visitors. These are people, who have stayed over at least one night, and has no reference to those passing through daily on the train. To the figures given must be added the very much larger number visiting Banff, Laggan and Field in the Rockies without passing on to the summit of the Selkirks. It may be stated as a significant fact for the future, that at Field during the summer of 1901 the guests were sleeping in Pullman cars along the side tracks, the hotel being filled to repletion. It has also been whispered, with what truth I cannot say, that as many as four persons have been booked for one room—three being out on little excursions while the fourth

was the occupant, *pro tem.* Moreover, although the railway company had just completed at Field a handsome addition to the original hotel, capable of holding from seventy-five to a hundred guests, it was found necessary to build still another addition for the prospective travel of 1903, and to construct at Glacier an entirely new hotel.

The administration of territory requires maps of its general features. Travellers in a new territory ask for maps, and thus a general topographic survey became necessary.

A topographical survey of the Rocky mountains was commenced in 1887, using the photographic methods already described, and a triangulation extended up the Bow valley as a base for the camera operations. The survey was expanded on either side for a considerable distance and carried over the summit to the Beaverfoot valley. It was discontinued at the close of the season of 1892, owing to Messrs. J. J. McArthur and W. S. Drewry, D.L.S., who had charge of the work, being detailed to conduct similar operations in connection with the Alaskan boundary survey. During the last season of work, W. S. Drewry made a reconnaissance survey in the Selkirks, with a view to extending the main Rocky mountain triangulation to that range.

A topographical map has been published in sheets covering 10′ of longitude by 7½′ of latitude, or a block of about sixty square miles. The published sheets reach nearly to the summit, but beyond this no finished map has yet been issued. It was intended to pick up the work where it had been discontinued, but owing to the fact that Mr. Edward Whymper, the famous English mountaineer, who made the first ascent of the Matterhorn, was about to enter the Rockies and conduct explorations and surveys in the interests of the Canadian Pacific railway company, it was decided to leave the field open and in no way hamper his operations. For this reason, the topographical work in the Selkirks was taken up, to be subsequently connected

Edward Whymper.

with the general system of triangulation carried up the Bow and down the Kicking-horse valleys.

Having decided upon the wisdom of a preliminary examination of the ground, arrangements were soon made: a leather knapsack, an aneroid barometer, a prismatic compass, maps of previous surveys and an assistant completed the list, and on the 9th of June, I started from Calgary for Revelstoke.

Mr. Whymper and party, who were on the same train, got off at Banff, where he proposed to make his headquarters for some time. Having never been at Banff, I stopped over for a day, met Mr. Whymper and was introduced to his staff, among whom were four Swiss guides, newly imported. He kindly showed me his outfit and instruments. It was evident that much care and experience had been employed in their selection, and that the weight had been reduced to a minimum. He further had the guides set up one of his specially designed Alpine tents. They are made of a light drill with a waterproof coating, are wedge-shaped, the sides and back end being joined at the base by a piece acting as a floor-cloth. When occupied, the weight would prevent the tent being blown away by anything short of a hurricane. Wooden supports are fastened to the ends and open out with the tent; a rope stretched over the supports and fastened to the ground at either extremity by piled rock acts as a ridge-pole and holds the tent erect. In one pattern the supports can be taken out or inserted at will, and during transit can be used as alpenstocks. They are of a good serviceable pattern when camping above timber-line.

In a short talk with Mr. Whymper, I soon learned that he would be moving much more slowly than my party and that there would have been no clash between us: however, it was now the Selkirks, so on to Revelstoke. In 1896, under instructions from the Surveyor General of Dominion Lands, Mr. J. J. McArthur, assisted by Mr. A. St. Cyr, conducted a phototopographical survey from Revelstoke south along the valley

of the Columbia river and Arrow lakes with a view to connecting the Dominion lands system of the railway belt with the International boundary. Mr. McArthur had measured a base line, on a long tangent of the branch of the Canadian Pacific railway running south to the Arrow lakes, about two miles from the terminus at Revelstoke. It now seemed likely that the same tangent would not only serve a similar purpose in connection with my survey, but also enable it to be made continuous with McArthur's.

I left Banff on the 11th of June by the Imperial Limited. It was a perfect spring day, for summer comes late in the mountains. The atmosphere was clear and fresh after a recent rainfall. The sun shone in dazzling splendour on snowy peaks and the fleecy clouds cast moving shadows on the ever-changing landscape. Full of the business in hand, the mind climbed rapidly through cool dark forests of pine, up ragged rock precipices, across shining snow-fields and glistening glaciers, occupying peak after peak and gazing afar on the silent grand array: here a rounded dome, there a sharp-cut pyramid, beyond the pinnacles and spires of some great cathedral mass and further still the castellated turrets and battlements of impregnable fortifications; across dark valleys filled with violet haze, where streams, like threads of silver, glisten in the soft warm atmosphere at depths that seem unfathomable. The mountains are in a smiling mood and fairyland is supreme. An eagle swoops into space and, hundreds of feet below, remains fixed, a dark speck against the sunlight on the opposite slope, then slowly soars in widening circles till a pin point overhead and—with a shock, the mind returns to realities and wonders how in creation survey instruments, cameras and the necessities of existence are ever to be taken up to these outposts of the earth.

On we glide, in serpentine folds, down the valley of the Kicking Horse; now with a roar into the darkness of a tunnel; now overhanging white, boiling waters; with the rush and

Edward Feuz. Fred. Michel. Jacob Muller. Karl Schlunegger.

SWISS GUIDES AT GLACIER.

swirl of the river always in our ears, first on one side, then on the other. Above, an endless array of crags and rocks rise forever; while the hoarse, weird shriek of the engine adds the last touch, and reverberating in every crack and hollow intensifies the fantasy of it all. It is with a sigh, akin to a relief, that the tension is broken and the gorge opens upon the dark green timbered swells and more gentle landscape of the Columbia valley.

On board the train, I met the engineer looking after the division between Golden and Revelstoke, Mr. H. B. Muckleston, who subsequently rendered me some kind assistance in connection with my survey.

Beyond the picturesque villages of Golden and Donald, we commence to climb the eastern slopes of the Selkirks, rising at the rate of 116 feet to the mile; and so, on a path carved directly from the mountain side, up the Beaver river valley to the Rogers pass, lying between Mts. Tupper and Macdonald—formerly known as Hermit and Carroll.

Over the summit and down the grade to Glacier House, situated at the foot of the great glacier, where heads the rushing west-bound Illecillewaet river. We stop here for supper. The pretty well-lighted rooms, the strange wild flowers decking the table, the white-clad waiters, the mountain bric-a-brac, photographs and pictures scattered around seem but a part of the grand transformation scene we have been enjoying all day. After supper, Mr. Muckleston introduced me to Mrs. Young, the lady manager, of whom I saw a good deal later on.

The sun had long set when we left Glacier House and the gathering gloom hid the view as we rattled down the western slopes along the valley of the Illecillewaet. The change in the noise made by the rapidly moving wheels from tenor to bass frequently indicated the passage over a trestle or a bridge; while the roar of rushing waters, heard even above the sound of the train, held the excited fancy always on the *qui vive*.

We put up at the Hotel Revelstoke. It is a comfortable, well-kept house, owned by the railway company and managed by Mr. H. A. Perley, formerly manager at Glacier House and well known to early visitors and explorers when the Selkirks first came into prominence as a tourist resort. The hotel is built upon a commanding bench, the view from the piazza sweeping the Columbia valley, at its second crossing by the railway, in three directions. On the left rise the snow-clad heights of Mts. Clach-na-coodin, Mackenzie, Cartier, and Sproat, the long timber slopes divided at the upper end of the reach by the deep, dark valley of the Illecillewaet river. On the right, the Columbia, here a noble stream four or five hundred yards wide, having made the northerly circuit of the Selkirks, flows at the eastern base of the Gold range. Just beyond the town, a glimpse is caught of the long railway bridge below the Big eddy and of the railway disappearing up the valley of the Tonkawatla river into the recesses of the Eagle pass. A short distance to the north, the dark heavily-timbered depths of the Jordan pass look dim and mysterious in the early morning light. To the south rise the majestic masses of Mts. McArthur and Begbie, the glaciers near the summit of the latter glistening brightly in the rays of the sun as it shows above the sky-line of Mt. Mackenzie; and further still, the shining river winding its way through dark green forests of fir, cedar and hemlock, the many channels terminating abruptly as hidden from view by the numerous islands dividing its flow.

As you gaze at the landscape before you, the dull red station and round-house, the unsightly water-tank, the lines of freight cars and battered old yard-engine, the rows of wooden houses and dusty roads grow dim and suddenly vanish from view; you see, instead, a grand unbroken sweep of forest reaching right down to the river. On a high, sandy bank, in full view of the Eagle pass, stand a group of men, ragged and weather-stained, gazing intently across the river. A tall, sun-

burnt, distinguished looking man, with a fair beard and commanding appearance, evidently the leader of the party, lifts his pack from his shoulders and points earnestly at a column of smoke rising from among the trees near the opposite shore. 'Thank God,' he exclaims, 'We have established our connection! Our friends are in front with the provisions on which we depend!' While they watch, figures emerge from the woods and two canoes are launched and paddled swiftly across the stream. As the canoes approach, fierce disappointment is visible on every face. They contain only Indians, a half-starved squalid lot out on a hunting expedition from Fort Colville. They speak no English, but, by the help of a little Chinook, make it understood that the expected relief party from Kamloops has not yet arrived. The tall fair man was Sandford Fleming (now Sir Sandford Fleming, K.C.M.G.), Chief Engineer of the Canadian Pacific railway from its inception until the year 1881. With him were the late Rev. Dr. Grant, Principal of Queen's University, Kingston, Ontario: his son, Sandford Fleming; Mr. Albert Rogers, nephew of Major Rogers, of Rogers pass fame, and five packers: the year, 1883. They had just travelled over the newly selected railway route through the mountains, by trail where any existed, and beyond, through virgin forest and untrodden gorge. They were expecting a party to meet them with provisions at the mouth of the Eagle pass, having only brought sufficient to carry them thus far, the Hudson's Bay post at Kamloops being still one hundred and twenty-eight miles distant. (See Sir Sandford Fleming's 'England and Canada, a Summer Tour between Old and New Westminster.')

On the 12th June, Mr. Muckleston took us down the Arrow lakes branch on a velocipede, to have a look at the long tangent we proposed to use as a base from which to initiate the triangulation for fixing the position of the camera stations. It was found to answer the purpose well, and that Mts. Mackenzie and

Cartier would be excellent and easily accessible points from which to expand to the east. The same day, I looked over the town, called upon some of the leading merchants and found that all the requirements of camp life could be had in good condition and at reasonable prices.

Revelstoke, formerly Farwell and before that referred to as 'The Eddy,' is a neat, well-ordered town, of some 2,000 inhabitants, prettily situated in a bend of the river immediately below a circular erosion in the right bank, known as the Big eddy. This recess is invaluable to the mill company operating here, for holding the logs cut along the reaches of the river above the mill. As the town becomes more populated and the buildings increase in number, its now straggling extremities will be cemented together, and a good street car service, to supplant the present single 'bus line, will render its extended location, due to the formation of the flat upon which it is built, a matter of little importance. It is the centre of a division of the Canadian Pacific railway, the headquarters of the superintendent and his staff and is chiefly populated by railway officials and employees with their families.

You are immediately impressed with the stir, bustle and brisk air of business that pervades the atmosphere. After the trip through the vast solitudes of the mountains, it is with a feeling of surprise that you come upon a live, stirring community in the very heart of the wilderness, with different subjects for discussion and different aims for realization, but fully as keen and alive to their interests as the people in the prairie towns on the other side of the Great Divide. In addition to its railroad interests, Revelstoke is a distributing centre for the Kootenay mining districts, and much travel to that section of country stops at this point on the way south viâ the Arrow lakes. It is also the head centre for miners and prospectors of the vicinity.

Hearing that two C.P.R. employees were going on a little prospecting trip up Mt. Mackenzie, I made arrangements to join the party in the hope of getting a good look over the country at this end. The official in charge of the stores kindly lent me some blankets, we packed provisions for three days in our knapsacks and turned in early. We were up at 3 a.m. the next day and well on the way by 4 o'clock. The trip was unsuccessful; about 5 a.m. it commenced to rain and continued during the morning. It rained and snowed all the next day, most of which, when not replenishing the fire in front of the tent, was spent under the blankets. On Saturday, it was fine, but cloudy, and although an ascent was made to the peak, nothing could be seen. However, I found here McArthur's cairn, erected for use in his survey down the Columbia valley. It subsequently did me good service. As the stock of provisions was exhausted, it became necessary to descend and we had only got well on the way, when the clouds disappeared and the landscape was revealed in all its glory. It was, however, too late to reascend.

On Sunday, the 16th, a beautiful day, we started east along the track, feeling all the better for our preliminary canter on Mt. Mackenzie. A stop was made for lunch at Greely creek, six miles from Revelstoke. Here, a rushing mountain torrent is crossed by the railway and on its bank stands a disused mill. I immediately marked the spot as a future camp ground, mentally observing that a large roof set on posts, formerly employed to protect some of the machinery, would serve excellently as a combined kitchen and dining-room. There was, moreover, quite a nice little patch of feed for ponies in the opening round the mill.

Before leaving Revelstoke, one of our prospectors had whispered that a strike among the trackmen in the employ of the railway company was imminent and that developments might be expected any moment. On reaching Twin Butte siding, ten miles from the start, the news was confirmed by the

foreman of the section gang, who informed me that he had been instructed to quit work the next day.

A mile and a half east of Twin Butte, two most picturesque mountain torrents meet immediately below the railway. They are crossed by a long wooden trestle about a hundred feet above the bottom of the ravine. When midway across, a freight train suddenly emerged from a cutting at the other end and took the trestle. There was nothing for it but to hang on to the side timbers of the bridge as best we might, not a comfortable position with a pack on your back and a hundred-foot drop below. That was the longest and slowest train I ever saw. I think we were both a little bit frightened as we shook ourselves together and vowed more caution in the future.

It was with a feeling of thankfulness that we saw the red section-house and tank of Albert Canyon come into sight round a bend; twenty-two miles of ties become tiring even though surrounded by the most glorious of scenery in the world. Albert Canyon village is built on a small flat, towards the north end of which the Illecillewaet is joined by its northerly branch. It was originally the headquarters of the Waverly mining company. The mine is twenty-four miles from the village on the headwaters of Downie creek. A good road has been built up the north branch and valuable machinery taken in, but no ore of any account has ever been taken out. The mine is now abandoned and, during the past summer, the machinery was removed and sold.

The village is most picturesquely situated in the midst of high timbered spurs and frowning cliffs, rising to snow-clad slopes and rock peaks capped with snow. To the south are two fine peaks, very nearly 10,000 feet above sea-level. In the recesses between them, several interesting looking glaciers form in part the source of the twin creeks, previously referred to, on the west and of Mosse creek (local name) on the east. The latter furnishes the water supply for the railway tank at Albert Canyon.

The Illecillewaet Glacier, showing red moraine recently vacated by the ice.

Some ground has been cleared and crops put in. A path, opened out through giant fir and cedar, devil's club, skunk cabbage and other tropical undergrowth, leads up one of the slopes for about half a mile from the clearing; here, a large spring bubbles from the ground, said to contain mineral properties. A bath-tub of cedar slabs has been made by the inhabitants, so arranged that it can be filled or emptied in about ten minutes; when not in use, the overflow from the spring passes through along the bottom. The water has a temperature of about 75 or 80 degrees. During the strike, the section men employed their leisure hours in enlarging the tub. It is now 12 by 20 feet. Judging by the quantities of soap lying around, the inhabitants are of a cleanly disposition.

It was with difficulty we obtained supper. A signboard proclaimed a dirty looking shack to be the 'Springs Hotel,' but the proprietor informed us that he had no cook and that the hotel had not been running since they took away his license—a rather significant fact—he could, however, put us up for the night. It was that or the open air, and nights are cold in these exalted regions. After a night of misery, we rose early and walked to Illecillewaet, six miles distant, for breakfast.

Albert Canyon village is located in a beautiful spot and with a good, well-managed hotel would become a most attractive resort for lovers of mountain exploration and climbing. The road up the north branch of the Illecillewaet gives access, for twenty odd miles, to as wild and grand scenery as can be found in any part of the range. The numerous branch valleys, in themselves gems of nature, lead to high rugged peaks, many of them accessible only to mountain goats or the best of Alpine climbers. To the south, a trail leads up and over a high timbered ridge to the headwaters of Moose creek, inclosed in a deep, gorge-like valley and overhung by glaciers, lying between jagged rock buttresses. On both these trails, ponies can be used, and plenty of pasture is found for them at the village.

To the west, about two miles away, not far beyond the tunnel, the rushing Illecillewaet is crossed by a swinging seat on a wire cable. Starting at the north bank, a trail, cut during the past summer, leads up Silver creek. The numerous auxiliaries of the stream are fed by snowfields and glaciers, from which rise majestically the many heights of Clach-na-coodin, while sparkling below, may be seen tree-clad lakelets; some bright emerald, some deep violet, others dingy brown.

Eastward, up the track, leads to the Canyon. Two miles from the village in this direction, the river is restricted by the tilted rock strata and pours through a narrow gorge with tremendous impetus. The rocks ascend nearly vertical from the water's edge to a considerable distance above the track, the bed for which has been cut from the face of the precipice and in places overhangs, on trestles, the gulf below. The scene is one of much beauty and grandeur.

The depth of the rushing water from the track looks far greater than it really is. Before closing the survey I had occasion to again walk over this part of the road and then climbed down and measured the drop with an aneroid barometer. A man was standing on the platform as I swung over and commenced to descend. 'Don't go down there, you'll kill yourself sure!' he called out, and stood staring with a pained expression on his face, until I was again beside him. Upon being asked 'How far down do you think the water is?' he replied, 'I don't know, at least a thousand feet!' Both descent and ascent had given the same results, one hundred and forty-seven feet. A platform has been erected above the chasm, and formerly trains stopped several minutes to allow the passengers to enjoy the wild beauty of the place; now the world moves faster and time is too precious to waste on matters so unprofitable. I confess to a preference for the good old days when time was not so valuable, and remember one morning at Field, when the boast of the C.P.R. that its conductors were endowed with true

4 The Lower Gorge, Albert Canyon.

Parisian politeness, was fully exemplified. I had been eating my breakfast slowly and looking round at the wonderful fluffy things (pussy willows) and other bric-a-brac with which the centre table was loaded, when the conductor came in, hat in hand, and remarked, 'The train is waiting, sir! As soon as you have finished we will start.' Now it's, 'All aboar-r-r-d.'

Illecillewaet was at one time a promising mining village, but its early aspirations have been nipped in the bud, and it now looks shabby and weather-worn.

The day previous we had been passing between steep slopes, covered by brulé and windfall, with here and there a belt of dark green timber, rising in shoulders to the bare snow-clad summits. The rock cuttings and boulders strewn around showed gray gneiss, in many cases highly micaceous and glittering brightly in the sunlight. Upon leaving Illecillewaet, the valley became narrower and hemmed in by steep walls of rock, rising in places almost perpendicularly to sky-line. The formation here is of a clayey schistose nature, crumbling readily upon impact.

Some snow-sheds are soon encountered, showing danger from snow and rock slides to be imminent. It is very pleasant to leave the heated sun-lit track and plunge into their cool, dark depths.

At two and a half miles from Illecillewaet is seen the prettily situated, but deserted, mining camp of Laurie. In a little grassy flat on the opposite side of the river, is placed a fine hotel, office and manager's residence, and to the right a number of miners' cottages. The river is crossed by a bridge. Near the track a brand new concentrator, equipped with the latest machinery, was convenient for loading ore into the cars. Perched high up on the perpendicular face of the cliff is the bunk-house, near the mouth of the main shaft. From this point, the ore was carried in iron buckets along a steel wire cable to the concentrator, 3,000 feet below. The cable was suspended

over a deep, rocky gulch to an open woodwork tower, erected on a projecting spur, midway between the bunk-house and the concentrator, from which point it descended sheer to the latter. It was customary for the miners to ascend and descend in the buckets. The cable has now been removed, but I should think it must have been a trip requiring much nerve.

The company owning these buildings had consolidated the group of which the Lanark, Maple Leaf and other well known claims formed a part, and had commenced operations on a somewhat extensive scale. The ore is a rich galena, but, through some miscalculation, was never found in sufficient quantity to pay and the very large sums of money expended on the building were practically thrown away, for recently the concentrator and machinery have been sold and removed to the Kootenay mining district. It is a pity that some enterprising company does not take hold of the hotel as a summer resort: for here, in the peaceful solitude of these greatest works of nature, the blasé and tired-out man of the world can find the rest he would search for elsewhere in vain. The trails of the miners give ready access to snowy peaks; and glaciers, snow fields, alpine valleys, lakelets and dense forests may be found galore on both sides of the track; while a daily mail from the east and west will keep the recluse in close touch with the world from which he has temporarily retired. At Illecillewaet village, two and a half miles distant, two bridges cross the river and trails are found leading in several directions, both north and south of the railway: all lead to summits or passes.

Beyond Laurie, the valley again widens and somewhat changes its characteristics; long timbered spurs stand out on either side, and dense beds of heavy timber fill in the intervening depressions and extend to the lower slopes of the main valley.

At Flat creek, about three miles easterly from Laurie, a good trail follows up the stream and over the divide, joining

the Fish creek valley, down which it passes to the Lardeau mining country. A little farther on, a second trail crosses the river by a bridge and leads to the north up Cariboo creek. Both are easily seen from the railway. Numbers of these trails or paths traverse the creeks and mountain sides. They are in most cases the work of the prospector, for Indians do not hunt much in the Selkirks, and furnish the only means of travel. Some are well cut out and of sufficiently easy gradients to admit of ponies or mules; others ascend the steepest and most difficult mountain sides and are too rugged and broken for any but human travel. As a rule, they ascend cork-screw fashion, keeping on easy grades until, some obstacle presenting itself, the path is turned and run up in the opposite direction, and so on to the top. They are frequently built by a Government appropriation.

Beyond Ross peak siding, the valley again contracts and the sides become steep and precipitous, rising to the summits of Mt. Green, Ross peak and Cougar mountain. At the end of the vista, to all appearances blocking further exit or ingress, reach heavenward the great monarch, Sir Donald, and his attendant court, Uto, Eagle and Avalanche. High on a shelf, carved from their apparently perpendicular sides, can be seen a white line representing the snow-shedding along the railway, while between lie the sinuosities of the 'Loop.'

At Cougar creek, a tributary of the Illecillewaet from the north, there is a large water-tank. Here, a convenient freight train, that had passed us at Ross Peak siding, was stationary while its engine was replenishing the water supply. The day having been hot and walking on the track very tiring, we got on board and were soon at Glacier House, three miles distant in a straight line, five by the railway. 'The Loop' is a lasting tribute to the skill and ability of Major Rogers, the chief engineer in charge of the construction. The distance was found too short to overcome the drop from the summit of the range to the bed of the Illecillewaet river, by a direct route. To meet the

difficulty, the shelf along the base of the mountain, above referred to, was extended to Mt. Abbott and the line carried up the valley of the stream draining the glacial basin contained by Mts. Abbott, Swanzy, Bonney, Green and Ross peak, now known as Loop creek. The valley is crossed and recrossed in a great pear-shaped curve, on high trestle bridges, and doubling back to Mt. Abbott, passes below its first traverse of that mountain at a depth of 125 feet; then, describing another wide curve, again crosses Loop creek close to its junction with the Illecillewaet river, having first, however, twice crossed the river.

On board a west-bound train, as it slowly creeps along the trestles, and you listen to the creaking, groaning timbers; as you gaze into space at the rushing broken water below, and above at the frowning peaks, part hidden by drifting masses of cloud; as the vapour-filled pass gradually closes to your view and Glacier House, the one bright spot of the surroundings, fades slowly in the distance, your thoughts rise above self in the wonders of creation, and, following on, pass to the indomitable iron will that carried the first explorers successfully through a wilderness that even now, seen from the midst of luxury, sends a feeling akin to a shudder through your frame.

A similar device for solving a difficult problem has been employed farther south on the Crows Nest branch of the Canadian Pacific railway, where the loop extends for some miles up the valley of Michol creek, and crossing and recrossing that stream takes the same hillside 175 feet below the upper line. In both cases, a very considerable part of the distance is covered on elevated trestle work.

The walk from Albert Canyon had been chiefly remarkable for the number of crossings of the Illecillewaet river and the variety of bridges by which they were effected. We had followed the river from its confluence with the Columbia at Revelstoke, through all its twistings and windings; watched it flow as a turbulent flood, gouging out the banks at each turn, and

Crevasse Formation in Illecillewaet Glacier.

broken only where some boulder had sufficient weight to stem its impetus: again as a boiling, surging rapid over rough, steeply sloping bed; then in falls and leaps, down rocky steps; till now, bereft of more than half its volume, it was only a mountain torrent that could be passed by leaping from boulder to boulder.

During the day, we had passed groups of idle men, washing their clothes, talking, laughing and evidently enjoying a holiday, the first phase of the strike. They regarded us with suspicion, assuming, for some unknown reason, that we were employees of the railway company. On reaching Glacier House, Mrs. Young was not in the office and we were consigned to the most distant corner of the farthest away building, 'Bachelor's Hall.' On meeting her after dinner, she apologized very nicely, stating that the people were under the impression that we were detectives, sent by the company to look after its property at Glacier. She had perfect confidence in her section men and feared no harm at their hands. She did not want detectives, and so we had been relegated to the farthest corner. Mrs. Young added in confidence, that if there had been a farther corner, we should have gone there. She now made amends by offering us any room we liked in the establishment, for we were the only guests. I may say that Mrs. Young's opinion of *her* section men, as she called them, was well founded. During my numerous visits to the hotel, I never met one of the officials or employees who could say enough in her praise, or who would not have done anything in their power to please her.

The chief wonder of the Illecillewaet, or Great glacier of the Selkirks, as you look at it from the lawn in front of the chalet, across the intervening belt of dark forest timber, is that it appears to tumble directly out of the sky between the steep, rocky slopes of the ridges known as Glacier crest, on the one side, and the south flank of Mt. Sir Donald, on the other. Although a mile and a half from the hotel, its immense mass

and height, over four thousand five hundred feet to the summit of the snow-field in which it has its source, dwarfs the immediate surroundings and foreshortens the distance. Very nearly the whole of the ice-fall is seen, but even so, like a first view of the Niagara falls, the feeling is rather one of disappointment than otherwise. To fully appreciate the magnificence of the spectacle, it is necessary to study it: to see it under different aspects, in light, in shadow, with the sun sparkling on its many ice points, and covered by a soft mantle of fresh snow; to go up among its crevasses; to stand beside its séracs; to follow its snow slopes to sky line and gaze upon the pigmy world below.

On the morning of the 18th of June, we rested and made the acquaintance of the four Swiss guides resident at Glacier House during the summer months. I used these guides later when establishing trigonometrical stations on Mt. Sir Donald and Swiss peak. I found them careful, patient workers and always cheerful companions; on snow and ice they are good, competent men; on rocks, my own men—Canadians—were, before the end of the season, quite their equals; and in the bush and brush could give them points. They are admirably adapted to the purpose for which they have been brought out. Many people go up on the ice of the surrounding glaciers and climb the rocky peaks, who would not dream of doing so without the confidence inspired by a guide at one or both ends of the rope. In the extended trips that will shortly be demanded by the more adventurous spirits and that must be arranged for, if interest is to be kept from flagging through the peaks immediately surrounding the summit of Rogers pass becoming hackneyed, they will be found of still greater service and the railway company is to be congratulated upon this successful addition to their list of attractions. A more careful attention, however, to the details of costume would have a pleasing effect, and fill more nearly the prevailing idea of the hardy and picturesque Swiss mountaineer.

Mount Sir Donald and Eagle Peak from below the Loop.

At 12 o'clock, with the two guides, Edouard Feuz and Charles Clarke, I started for the glacier and Mt. Lookout. Added to a charm, peculiarly its own, of climbing on snow, was the exhilaration and excitement of setting foot upon a glacier for the first time. All was new and interesting; the turbulent mud-coloured streams issuing from its base; the boulder-packed moraines, existing evidence of its ebb and flow; the deep, dark crevasses, with sides of gleaming ice; the grotesque but imposing séracs, standing like a city of mummies, newly raised; the limpid pools collected in the hollows; the glistening névé of pure white snow reaching to the feet of the rocky sentinels guarding it for ever. I think the guides assumed the rope, more from force of habit than actual necessity; it is, however, a wise precaution, where the least danger exists, not so much for its actual usefulness as for the confidence inspired. You are far less likely to lose your footing with a good manila rope around you and an experienced guide at the other end, than without.

I did not go beyond the second highest point of Mt. Lookout, as I wished to have sufficient time to study the surroundings. A considerable portion of the Selkirks world lay below, above and around. By the assistance of my prismatic compass and map, I was able to locate, with ease, most of the peaks bearing names: To the north-east, out-topping all aspirants, rose the isolated mass of Mt. Sir Donald, so named in honour of Sir Donald A. Smith—now Lord Strathcona and Mount Royal—chief representative in Canada of the Honourable the Hudson's Bay Company, President of the Bank of Montreal and Senior Director of the Canadian Pacific railway, who drove the last spike at Craigellachie on the 7th November, 1885. It was first named 'Syndicate peak' by Major Rogers in 1881, but the name was subsequently changed by Order in Council.

In rotation northward are seen the less exalted peaks of the same chain, Uto, Eagle, Avalanche, and on either side of the gorge through which the railway reaches the Rogers pass sum-

mit from the east, Mts. Macdonald and Tupper, guarding with everlasting vigilance the Great National Enterprise. The former was originally Carroll and the latter Hermit, but they were rechristened in honour of the statesmen, who had so warmly supported the construction of the transcontinental highway, the true solution of the Northwest Passage. Still to the north, outlined against the sky, rose the new Hermit, formerly Stony mountain. Stony creek, a tributary of the Beaver river, has its source in a glacier upon its northern flank.

Westward, along sky line, appear next the sharp points of the Swiss peaks, the second and highest showing, like the figure of a tiny man, the cairn raised by Carl Sulzer of the Schweizer Alpenclub to commemorate the first ascent of that peak. Then Rogers peak, after Major Rogers, the pioneer white man to travel over the summit by the pass which bears his name. Again westerly rise Grizzly, Sulzer, Roy (the names Sulzer and Roy are now abandoned) and, isolated between Bear creek, Cougar creek and the Illecillewaet river, the pyramid of Cheops, with its outlying spur, Napoleon.

Across the river, looking south, may be seen in order: Ross peak and Mt. Green, a tribute to the Rev. William Spotswood Green, M.A., whose charming and instructive book, 'Among the Selkirk Glaciers,' accompanied by the first detailed map of the vicinity, was published in 1890, and may be classed as a text-book of the region; then, the long escarpment of Mt. Bonney, named after Professor Bonney, President of the English Alpine club at the time Mr. Green made his survey; it forms one side of an enormous amphitheatre, a very birthplace of glaciers. Still eastward, forming the south side of the amphitheatre, are Clarke's peak and Mt. Swanzy, the latter after Mr. Green's travelling companion, the Rev. H. Swanzy. Beyond Fish creek may be seen the sharp peak of Mt. Donkin, named by Mr. Green in 1888, after Mr. Donkin of the Alpine club, killed that year in the Caucasian mountains; and to the

distance the snow white summit of Mt. Purity; then, the master mass of Dawson, in honour of the great geographer and geologist, the late George Mercer Dawson, D.Sc., F.G.S., Director of the Geological Survey of Canada. It is the highest in the vicinity, out-topping even the monolith Sir Donald by some three hundred feet. Its two summits are named after the Swiss guides, who made the first ascent with Professor Fay of Tuffts college, Massachusetts, and Professor H. C. Parker of Columbia university, the easterly Häsler and the westerly Feuz, who even now sat beside me. I asked him if he did not feel important in having this highest point of the Selkirks bear his name. With a true Swiss shrug he replied laconically, 'Oh no!'

Next, Mt. Deville,* in honour of the present Surveyor General of Dominion Lands, a scientist of much repute, who has introduced into Canada the application of photography as a method of making topographical surveys. Nearer this way is the square peak of Mt. Fox, commemorating a member of the Alpine club, who, with Mr. Donkin, lost his life in the Caucasus in 1888. And last, but not least, rising from the pure white snows of the Illecillewaet névé, Mt. Macoun, in honour of the well known naturalist and botanist, Professor John Macoun, M.A. There they stand in grand and lasting array, a lexicon of the great dead and living; it is a lesson worth the learning and one not soon forgotten.

I have not enumerated the minor points, such as: The Dome, The Rampart, Castor and Pollux, Glacier Crest, etc.; they were all in full view, but, while of much prominence when looked at from a lower position, from above became insignificant as mere spurs and ridges of the dominating peaks. I had learned much and descended to the chalet well satisfied with the results of my afternoon scramble.

* There is a Mt. Deville in the Rockies that has been confirmed by the Geographic Board, consequently the above name has been changed to Mt. Selwyn.

Before retiring, arrangements were made with Mrs. Young to ascend Mt. Sir Donald the next day. She kindly placed the guides at my disposal. I selected Edouard Feuz and Carl Schlunneggar, but as Charles Clarke had never made the ascent, it was also decided that he should accompany the party. It was not necessary that I should ascend Mt. Sir Donald, as the panorama seen from Mt. Lookout had supplied all the information required for the present, but I was anxious to ascertain the possibility of taking a survey camera and transit to the top; for, from its prominence and the fact that it out-topped all the surrounding peaks, it would prove a very valuable trigonometric station. Unfortunately, I did not at this time succeed. We were up the following morning before daylight, had breakfast and stepped out ready to start. The weather looked ominous, black clouds and scud around the peak. The guides declared the climb dangerous in bad weather at this time of the year, so it was postponed until the morrow. It turned out a beautiful day, and had we started all would have been well. The next morning it rained and we were not even called. Again, a third disappointment; so, after breakfast, we shouldered our knapsacks and set out upon the last day of the tramp. It soon cleared and became fine, rendering the walk over the summit most enjoyable.

On both sides and immediately at the divide the way lay over and through snow-sheds. On the west, the sheds are rendered necessary by the steep and treacherous slopes of Mt. Avalanche, on the east by the almost perpendicular descent from the summit of Mt. Tupper. Looking at the great piles of rock, tree trunks, dirt and other debris that are swept down the steep mountain sides by the masses of sliding snow, one wonders that it is possible to devise structures that can withstand the awful impetus; and yet, the engineers of the company have been very successful in this respect and it is only at rare intervals that a shed is swept out of existence. Their success is due

Snow-sheds and Glaciers along the Illecillewaet Valley.

to the skill displayed in construction: the sheds are built at a natural angle with the slope, permitting the mass to pass over without a greater strain than its own weight. In addition, crib-work fences, glances and other structures are placed high up on the mountain sides to turn the rushing torrents of snow and direct them into safe channels. One of the fences may be seen in the accompanying illustration, taken from the top of a snow-shed at the summit. Reference to these sheds will be found in the appendix in an article by Mr. H. B. Muckleston, C.E., one of the company's engineers, previously referred to. An interesting and instructive monograph, well illustrated, has also been published by William S. Vaux, Jr., of Philadelphia. It was written for the Engineers' club of that city (Vol. XVII., No. 2, of the proceedings, May, 1900), and is entitled 'The Canadian Pacific Railway from Laggan to Revelstoke, with map of railway.' Special reference is made to snow-shed construction, illustrated by some neat drawings.

While the sheds protect the passing trains from a very great danger, they are, themselves, liable at any time, to destruction by fires that may be raging in the contiguous forest or started by a spark lodging among their dry timbers. To guard against this contingency, watchmen are stationed at intervals along the track. Telephones connect the cabins in which they live with the nearest operating stations. Each watchman daily goes a tour of inspection through the sheds allotted to him, prior to the passage of an express train, to see that the line is clear and in good running order. In addition to these precautions, the sheds are furnished with fire alarms, hydrants, hose, nozzles and as perfect a system of water-supply as the possibilities of the location admit of. That much personal danger is incurred by the company's officers and servants, in this connection, is evidenced by the death of the late Assistant General Superintendent of the Pacific division, who was instantly killed in the summer of 1901, by a rock falling from the roof of a burning

shed, while directing the clearing of the track. There must have been great danger, for he had just laid his hand upon the foreman's shoulder and shouted, so as to be heard above the roar of the flames and the din of falling timbers, 'There will be some one killed here yet,' when the rock fell striking him on the head.

The casual tourist, viewing the line from the observation car, vanishes into one of these tunnels, where, in contrast to the brilliant sunshine, all is pitch darkness and smoke. He reappears at the other end rubbing his eyes and blowing his nose, and before he realizes that an opportunity has come for a glimpse of the scarred and seamed rock precipices of Mt. Macdonald, rising heavenward a full mile, the glacier near the summit looking a snow spot from the depths below and its cascades like jets of spray, he is into another hole and again enveloped in darkness and smoke. To appreciate these marvels of engineering skill and the wonderful precipices that they hide, you must have leisure to walk through them, to examine them, to study them.

At the summit of the pass an open stretch of meadow-land extends, on the south side, for half a mile; the same meadow-land that gladdened the eyes of Major Rogers in 1882, when, having ascended Bear creek to the summit, he recognized the familiar patch of grass land seen the year previously from the slopes of Mt. Avalanche. Following in the footsteps of Mr. Walter Moberly, he had then reached the summit from the west by way of the Illecillewaet river. I saw that this spot would furnish an excellent camp ground for a base from which to reach the surrounding heights; indeed, evidence was plenty that it had been the site of many a camp ground.

A short distance north of the summit, Bear creek emerges from between an outlying spur of Mt. Cheops and the southerly flank of Mt. Grizzly, and flows between the precipitous slopes of Macdonald and Tupper. The railway follows the narrow

New Steel Bridge over Stony Creek.

New Steel Bridge over Mountain Creek.

valley on the north side, along a shelf cut from the slopes of Mt. Tupper, and gradually rises from the bed of the creek until, at the junction with the Beaver river, five miles farther on, it is some nine hundred feet above the stream. Near this point, a fine cascade, fed by the snows of Mt. Tupper, tumbles down the mountain side and passing beneath a bridge of dressed masonry joins Bear creek.

The railway now continues down the valley of the Beaver, descending at the rate of 2·2 feet per hundred. The road-bed for the greater part of the distance to Beavermouth is cut directly from the steep slopes on the west side of the valley. To appreciate the difficulty of the undertaking, a position should be taken on the edge of the prairie hills bounding the Beaver valley on the east; from such a point of vantage, the road-bed shows like a white line against the dark background of the western slopes. With a field glass, as many as twenty bridges can be counted.

To descend from the Rogers pass summit to the level of the Columbia valley, it was necessary to keep high up on the mountain side; this naturally necessitated the passing over a number of beds of torrents. The principal are: Stony creek, Surprise creek and Mountain creek. They are now crossed by fine steel bridges, the first being three hundred feet above the torrent it spans. Each is of a different type, suited to the formation of the chasm which it traverses.

Prior to construction, the Beaver valley was one of the most beautiful portions of Selkirk scenery. It possessed a softness and variety, not seen in the wilder and more rugged sections, where the nearness and cold grandeur of the surroundings inspire a feeling rather of awe than of pleasure. Here, the river, a milky green in colour, is seen winding its way through the dark masses of spruce filling up the bottoms, varied by golden patches of marshland and shining ponds half hidden by trees. And what trees! Professor Macoun, when camped here

in July, 1885, waiting until the completion of Stony creek bridge should enable him to visit Rogers pass, speaks of them as follows:—'The timber in the Beaver valley is of stupendous proportions. Cedars were seen over ten feet in diameter, and trees on the slopes between Six-mile creek and Rogers pass from 150 to 200 feet high.'

Alas! It is all changed; the advance of civilization has swept nature out of existence; the fire-demon has done his work, and excepting along the immediate bottom of the valley, nothing remains of the grand forests but an unsightly array of gaunt skeletons and fallen monarchs.

Near its junction with the Columbia, the bed of the Beaver river is much contracted and the stream flows turbulently in a rock channel of which the strata are twisted and tilted at every conceivable angle. At one point in particular, it passes between great slabs set on end, through a gap so narrow that it looks as though one might jump across. It does not exceed twenty feet in width and is known as 'The Gateway.'

At Beavermouth, I met a man, who offered to sell me as many pack-ponies as I required at $25.00 each. He had at Golden a number of these animals. My trip had been most successful and information had been gathered that would enable me to commence the survey without delay.

In 1886, Mr. O. J. Klotz, Assistant Astronomer to the Department of the Interior, had made a declination survey of the line from the summit of the Rockies to a point near Revelstoke, where he had connected with a similar survey by Mr. William Ogilvie, D.L.S., carried eastward from the Pacific coast. The surveys were made in conjunction with a series of latitude and longitude observations and had in view a true location of the railway as a base for future surveys within the forty-mile belt. Reference marks were then placed at every mile, or more frequently; to do this, the company's telegraph posts had been used, and the letters 'C.P.T.' (Canadian

The Devil's Gate, Beaver Canyon.

Pacific Traverse), with the number, cut deeply into the post. The method was undoubtedly a mistake: for although the posts afforded prominent and ready points for reference marks, yet many have since disappeared, owing to the poles having been renewed or the rotted part cut off and the poles replanted, the 'C.P.T.' being buried. Notwithstanding, a number were found and subsequently made good use of.

Camera Station, Mount Abbott.

CHAPTER II.

THE SURVEY.

1901.

As the result of my preliminary trip along the railway, it was decided to commence work at Albert Canyon village. At the summit there was too much snow, and the climbs were too severe for a green and untried party. Moreover, the time at my disposal was too short to set signals in advance, and I desired to have some ready for use when working from the base up. For these reasons, Albert Canyon, twenty-two miles from

In the Forest at Glacier House.

Revelstoke and twenty-five miles from the summit, seemed to suit well. Besides, there were at least two trails that would be of material assistance at the start. A party and outfit were soon got together, and on the 8th July, we found ourselves under canvas at Albert Canyon station, within a few yards of the track and with Moose creek at our feet.

We were deeply involved in the mysteries of the diamond hitch, and already had several of the ponies loaded, when along came the delayed express, puffing, panting, full of business and its own importance. Pack animals are always restless for some time after the loads are cinched on, and the train rushing in beside them settled the matter. A general stampede ensued: ponies careered in every direction, prancing and snorting; men rushed here and there, shouting and swearing, trying to hold them; everything was frantic and desperate. Despite our efforts, one broke away, dashed madly through the brush and fallen timber, leaped a tree trunk, four feet high, and rolled head over heels on the other side; then, having burst the hook from the lash-rope and scattered the pack to the four winds, went wildly scouring through the clearing among the fallen logs and other débris with which it was littered. The train was crowded with passengers by the latest steamer from Japan, and the observation car full of people. These cheered, clapped their hands and waved their handkerchiefs, while some even went the length of shouting '*Encore*.' They were evidently under the impression that it was all arranged by the fatherly management of the C.P.R. for the amusement of its passengers. There seems to be a general idea, among a section of the travelling public, that the company provides stage effects as an advertising medium. A story is told at Glacier House of a certain lady from Seattle, who ordered a pony to go and see the great Illecillewaet glacier. She rode to the edge of the forest, gazed for awhile at the enormous mass of crystal ice rising 4,000 feet in front of her, then returned to the hotel and asked in all earnest-

ness: 'Is it a real glacier, or only one that the company has put there for an advertisement?'

The diamond hitch, or rather series of hitches that shape a diamond, is the combination of rope twists by which a load is kept in position on the back of a pack animal. I am not aware who invented it—he should have been knighted. It is most ingenious and effective, but difficult to learn and remember. It looks so simple and is done so quickly that, seen once, you are sure you have it, and it is only when you try that some little point always goes astray. A pack, properly tied on will go without a move for an entire day, over the roughest of country, through woods, windfall, or any place in which a horse is capable of motion.

In the 1887 report of his topographical survey of the Rocky mountains, J. J. McArthur writes: 'About six miles up, we came to a tributary canyon, about one thousand feet deep: it took us a whole day to get across. The descent to the creek was made without accident, but the other side was heavily timbered and much steeper. We reduced the packs, intending, after we should get the horses to the top, to return and carry up the remainder ourselves. About every fifty feet up the zigzag pathway, resting places had been cut in the side of the hill. We succeeded in making one horse carry his load to the top, but the second one, after we had got him half way and with his fore feet on one of the resting places, balked and, falling backwards, rolled down the side of the canyon. He made two or three frantic efforts to arrest himself and then disappeared, the loud ringing of his bell telling of his violent descent. In a few seconds this had ceased and we started after him, clinging to the brush and over sharp precipices, expecting to find him with his neck or limbs broken. About three hundred feet down, we found him lodged, head downwards between two trees. The imploring look in his eyes told us he was alive; *his pack had not been displaced*, but our alpenstocks, which were tied on top,

8 THE ROCKY MOUNTAIN GOAT (*Haplocerus montanus*).

were both broken off close to the irons. We removed his load and with some difficulty extracted him and were surprised to find that, with the exception of half a dozen small cuts and a few bruises, he had escaped uninjured.'

On the morning of the 9th of July, taking two pack horses, we ascended the trail up Moose creek (South river) to the summit of the high timbered ridge south of the village.

The trail rises in zigzag gradients and on reaching the crest of the ridge descends to the valley of the creek beyond. It is said the trail was commenced to connect with the Fish creek valley and that there is a pass, but it has not yet been completed the entire distance. At the crest of the ridge, branching off to the left, the ponies were taken for a mile and a half through the timber, but it entailed such heavy cutting that, finding a convenient pool at which to camp, it was decided to make the remainder of the distance with the instruments on foot.

The following day, two points, about one mile and a half apart, were occupied on the high spur nearly due east of the village. On the way up, we disturbed a mountain goat, who, having taken a good look at us, ambled easily along the face of a precipice and disappeared round a corner. Albert Canyon village is 2,227 feet above sea-level. The first station occupied is at an altitude of 7,276 feet, or 5,049 above the railway. It overlooks the railway and village of Illecillewaet to the east, the railway and village of Albert Canyon to the west, and northward the westerly slopes of the valley of the north branch of the river and the snow-clad peaks, glaciers and valleys beyond. The station is recorded as 'Albert Canyon East.'

The second point occupied is on the same ridge. It overlooks the two branches of Moose creek and gives a fine view of the two high peaks immediately west across the valley. They are little short of ten thousand feet, the altitude of the northerly one being 9,562, and that of the southerly 9,998 feet. Three glaciers hang upon their eastern flanks. So far as I could learn,

they have not been named. I would suggest the 'Albert peaks' as appropriate, and that the creek at their eastern base be changed to 'Albert creek.' The second station is 7,829 feet above sea-level and has been recorded as 'Moose Creek East.' Looking south, the view is wild and rugged in the extreme. Near at hand may be seen six small glaciers and beyond, several large snow fields. These valleys, with their surrounding precipices, crags, glaciers and summits, will furnish a fruitful source for the explorer and mountaineer, and the Albert peaks, from this side at least, are worthy of a conquest; what features they present upon their western faces had yet to be discovered.

While the stations were being occupied, other members of the party were sent to place a signal upon a prominent point on the north side of the river. A signal had also been placed beside the railway, a short distance westerly from the station-house. They consisted of white cotton targets nailed at right angles to a pole, twelve to fifteen feet high, according to circumstances; the pole is held upright by three supports nailed to it in the shape of a tripod. Both signals were clearly seen through the telescope of the transit-theodolite and angular readings taken upon them. A full set of views were also obtained at each station.

On the 13th and 14th of July, a trip was made up the north branch of the Hlecillowaet along the road leading to the Waverly mine. Two cameras and transits were taken and, having reached a camp ground, the party divided, ascending on both sides of the valley to the crest of the slopes forming it. The station southeast of the stream is named 'Canyon station,' from the fact that it is nearly above the Albert canyon. It is at an altitude of 5,640 feet. That on the north side, or 'North Fork' station, is 7,047 feet. Both command a fine view up the valley of the north branch, disclosing an array of tributary valleys and, at their heads, rugged snowy peaks, many of them apparently over ten thousand feet above sea-level. The good

THE RAILWAY SUMMIT OF THE SELKIRK RANGE, SHOWING SUMMER AND WINTER TRACKS.

road up the stream, affording facilities for the use of pack animals, furnishes an excellent opportunity to explore the wild beauties of the surrounding country. On its way, the trail crosses the stream several times by bridges in good repair, and thus both sides can be reached.

To occupy the next station, it was necessary to cross the main river. This was accomplished by means of a wire cable, consisting of four telegraph wires twisted together. They had been stretched across near the mouth of Silver creek, a tributary from the north, joining the Illecillewaet about two miles below the village. The cable is secured at one end to a beam on which rock has been piled, and on the opposite bank to a tree stump. The river is here about 150 feet wide and rushes like a mill sluice, fifty feet below. A narrow board, bolted to a two-wheeled trolley on the cable, forms the medium of transit; an endless rope enables the trolley to be hauled to and fro. The contrivance looked old and worn and decidedly suggestive of sudden death. When examining it for the first time, I asked an old prospector who happened along, 'Do you think it will carry two?' He replied, 'I dun'no, she been't very strong.' As this was my own opinion, the camp outfit was sent over by instalments and the passengers one at a time.

Camp was pitched in the thick timber on the opposite bank and, on the 16th, 17th and 18th, three stations were occupied: one on the south side of the river, 'Albert Canyon West,' at an elevation of 5,363 feet, and two on the north side, 'Albert Canyon North,' elevation 6,999 feet, and 'Silver Creek East,' 7,584 feet above sea-level. The last is a prominent isolated point commanding an excellent view up the north branch of the Illecillewaet on the east and Silver creek on the west. To occupy the latter stations, it was necessary to make a camp at timber line and for this purpose to carry up a light tent, blankets and provisions in addition to the camera and transit, a work of much labour. Indeed, I found it was very seldom

possible to make an ascent and occupy a station properly the same day. An ascent with packs usually takes from five to six hours, the work at a summit, three to four hours, according to the number of camera stations, and the descent about three hours, or twelve hours' continuous labour of the hardest kind; for the instrumental work requires the closest attention and is quite as fatiguing as the physical portion. The above estimate is on the assumption that clear, bright weather prevails throughout the day, which, in the Selkirks, is the exception, not the rule. Try this sort of thing for five or six days in the week and then see how you feel on the seventh.

While here, a party in the employ of the Government was engaged in opening a pack trail up Silver creek, to give access to mineral deposits said to exist on some of its numerous branches. Four tributary streams feed Silver creek. Each has a fine deep valley, heavily timbered at the base of the slopes containing it; then leading by a series of alpine slopes to the glacier or glaciers forming the source of the many silver threads that wind through the grassy uplands. Beyond, to the west, from beds of snow, rise the ragged ridges and white domes of the group called 'Clach na-coodin.' These charming valleys, tenanted only by the wild goat and the caribou, have a wonderful fascination when seen from above. Their dim and mysterious lower depths suggest difficulties that add zest to the endeavour to reach the bright uplands; and there is always what lies beyond sky-line as a final goal. The main creek is renowned locally for the quantity and size of its trout. A bridge across the river at the site of the cable could easily be reached from Albert Canyon village and would open up a most beautiful region to lovers of nature.

On the 20th, camp was moved to Twin Butte siding, ten miles westerly. The move was made by means of one of the company's push-cars. On the road down, the cook shot three bears, an old one and two cubs. Both cubs climbed a tree,

The Big Horn or Rocky Mountain Sheep [illegible]

instinct failing to tell them that this was no protection against modern firearms. There was not time to pick up the carcasses, as a freight train was expected shortly and it was not desired to unload by the way. The old bear and one cub were subsequently brought in. They proved to be the ordinary brown bear of these regions, not of large size. The pelt was in poor condition, although the cook subsequently sold it for five dollars. The meat of the cub was found palatable—like coarse beef with a taste of pork—and the old one made good soup.

On the 21st of July, my two assistants, young men studying for the profession of land surveyors, who had been with me during the survey of the Crows Nest coal lands in south-eastern British Columbia, left the camp. They found the labour too great for their powers, and they did not desire to become attached to a branch of the profession entailing such hardship and extreme physical exertion.

On the 22nd, a station was occupied to the south of Twin Butte siding at an altitude of 6,996 feet. It commanded the upper reaches of the two creeks previously referred to as those crossed by the long trestle where we were caught by the train. The station was a good one, presenting magnificent views of the Illecillewaet valley both east and west. Easterly, the river could be seen winding, at the foot of the great buttresses extending from the Clach-na-coodin group, the entire distance to Albert Canyon; westerly also it could be followed almost to its junction with the Columbia, and the snow-capped domes of the Gold range and the Jordan and Eagle passes beyond Revelstoke were distinctly in view. Rising steeply from the east branch of the Twin creeks, the great mass of the Albert peaks was seen at close range. Although apparently much more accessible from this side, it could be realized that many problems were presented for solution. Three small glaciers are enwrapped in its folds. I promised myself a closer inspection at an early date.

Next day, I walked to Revelstoke and hired two men to

make up the deficiency in the party. One, an Irish Canadian, had been a member of the Strathcona Horse in South Africa and whiled away many an evening, up near the stars, by stories of the war. He was an untiring worker, and his ability to travel through the bush with a pack on his back, at once constituted him the leader among the men. George could not, however, stand on a height overlooking space, and had always to keep on the lee side of a precipice. The ability to do this is not given to every one, and no amount of education or nerve can overcome such a weakness. It may safely be said that those who can stand in precipitous places at great heights are very much in the minority.

On the 24th July, using the ponies, camp was taken to the westerly of the Twin creeks, immediately below the long trestle, in order to be sure of an early start the following day. We were up at 3 a.m. and, crossing the creeks, ascended the ridge extending westerly from the northerly of the Albert peaks, reaching a plateau 5,000 feet above the railway by noon. The day was very warm and the road much encumbered by fallen timber, consequently the time of ascent was slow. Leaving the party to make camp, accompanied by George, I started on up the ridge. Several hundred feet higher, we found one of J. J. McArthur's signals, placed in his reconnaissance survey of these regions—a tin cone on a cairn of stones, held in position by wiring. A few hundred feet farther up brought us to a prominent point already observed from below. From here, a sharp arête leads to a col, and beyond, a second arête rises to the summit of the northerly of the Albert peaks. The ascent by this path presented many difficulties in the shape of rock cliffs, and, even if practicable, would take considerable time. The alternative route lay across the foot of a glacier and up the arête on the north side, which likewise appeared to present many difficult places. From a mountaineer's point of view, the peaks will furnish an interesting climb; from a survey point of view,

however, the time required to reach the summit of either would not be compensated by the results: so it was decided to occupy the point already attained and the following day we completed the usual round of photographs and transit readings. The altitude of the station, 'North Twin,' is 8,033 feet, 6,050 above the railway; as previously stated, the altitude of the north peak is 9,562 and that of the south peak 9,998 feet. The views were good and the cloud effects magnificent, although brewing thunder storms filled the valleys with gloom. That night it snowed and stormed, and the next day we were enveloped in clouds and heavy mist.

July 29th, again using the push-car, camp was moved to the old mill at Greely creek, six miles from Revelstoke. It was an ideal camp ground. The tents, four in number, were ranged on three sides of the large open shed where the cook had established his quarters. An impromptu table, sideboard and benches were quickly constructed from the old boards lying around, and the camp cook-stove glowed merrily in one corner. A board inserted in a crack in the mill flume brought water almost to our feet and the huge roof kept off the rain and shine. The open patches around the mill were well grown with timothy and the ponies got fatter daily. Raspberries grew everywhere in wild profusion and a dishful could be picked without going twenty yards from the camp. I have always looked back upon that camp ground with pleasure, and regretted that most of my time was spent away from headquarters.

The last two days of July were spent on the ridges immediately east of Greely creek and between it and the Twin creeks. Three stations were occupied, 'Greely Creek East,' 'Greely Creek South' and 'Twin Creek West,' at altitudes of respectively 7,241, 7,749 and 7,568 feet; the altitude of the railway at Greely creek is 1,699 feet. The views were much like those taken from other stations, except that numerous lakelets and ponds were noticed in the alpine valleys above timber line and,

if possible, the scenery was bolder and more rugged. The locality was chiefly remarkable for the quantities of deer seen. Early on the 31st while ascending a ridge, a huge caribou suddenly appeared fifty yards away and trotted to the crest at a very leisurely gait. A little later, while at the 'Twin Creek West' station, two small deer and two fawns walked slowly to a patch of snow, 150 feet away, and lay down rolling and rubbing in it. They remained fully fifteen minutes. Later still the same day at 'Greely Creek South,' on a grassy plateau some hundreds of feet below, I counted no less than thirteen deer, large and small. The headwaters of the creek seem to be a veritable stamping ground. There are a number of tributary valleys with grass-land slopes where they congregate to feed. To approach these valleys the ridge should be ascended from the railway. The course up the creek is arduous and uncertain; moreover, the deer look for enemies in that direction and appear to pay little attention to what lies above them.

For the first time since commencing work, the deadly enemy of photo-topographical surveyors was now encountered—smoke from bush fires. The continued dry summer weather, since the middle of July, most unusual in the Selkirks, had rendered the thick second growth and dry brush, with which the old burns are littered, most inflammable, and volumes of smoke could be seen rolling up from the Columbia valley, turning the sun to a ball of fiery red and wrapping Mt. Begbie and other massives of the Gold range in a ghostly shroud.

On the 2nd of August we crossed the Illecillewaet river, using for the purpose an 'Acme' folding canvas boat, capable of holding two passengers and a few bundles at each trip. I had seen the boat at Glacier House and it was now loaned to me by Mrs. Young. The river was in flood and it was difficult to find a possible crossing place. However, there were two good boatmen in the party and the remainder were fearless fellows to whom the scotting, although perilous work, was good

The Caribou — *Rangifer tarandus*

fun and in a couple of hours we were across and had pitched camp in the woods on the opposite bank. From here, the usual outfit was taken to timber line and several stations occupied on the west side of the Clach-na-coodin group. The elevation of the highest point photographed from is 7,983 feet above sea-level. Below this point, reposing in an elevated rocky basin, lay a small lake of bright emerald green, the water having a translucent rather than transparent appearance. I am not aware what causes the colouring. It is not due to reflection, for the colour remains the same in cloud or shine. I have, moreover, seen three of these little lakes close together in a valley, one emerald green, one deep violet and the other dingy brown.

On the 8th, camp was moved to Revelstoke by freight train, swimming the horses across the river and sending them in by the trail along the north bank. The new camp was established some three miles from the town, in a belt of green timber bordering the clearing of a so-called rancher. The Columbia valley, at this point, was on fire and to reach the ground selected, the team and wagon conveying the outfit had to pass through blazing bush. Indeed, the very bush in which we camped was burning on three sides. The crash of falling trees could be heard during the silence of the night like the reports of cannon, and in the morning the tents would be found thickly covered by ashes. Green bush, however, burns slowly when there is no wind, and it was but a few yards to the clearing. Gangs of men, some in the employ of the Government, were fighting the fire day and night and soon had it under control, although it was not finally extinguished until the first snow fell, early in September. The camp was in a very convenient position, a blazed path, made through the bush, connecting it with the north end of the long tangent on the Arrow Lakes branch of the Canadian Pacific railway. It was the point where I proposed to measure a base to fix the scale of the survey and extend the

established elevations along the railway to the camera stations that had, thus far, been occupied.

The work in the Columbia valley was full of discomfort. Smoke hung like a pall over the landscape, the heat was intense and dust and ashes were everywhere. August 12th, 13th, and 14th were spent in base-measuring. This was done by using a hundred-metre steel tape, one eighth of an inch wide. The measurements were made along the west rail. J. J. McArthur in his survey of the Columbia valley had previously measured the same base and had then planted blocks of gneiss at either end, a rectangular cross being cut on the stone in the line of sight. They were easily found. The entire distance from end to end is 26,136 feet, slightly under five miles. Measuring could only be carried on before 10 a.m. and after 4 p.m.; between these hours the roadbed became so heated that the temperature was beyond the limits fixed, within which work was admissable.

The growth in the valley is tropical in its luxuriance: gigantic cedars, Douglas fir, spruce and hemlock, with thick tangled undergrowth. I have seen cedars cut along the right-of-way measure twelve feet across the stump. At that size, however, they are mere shells, the entire inside having been eaten up by dry rot. The fir, though not so large, is of great size and good sound timber. The trees grow to a tremendous height and the dense foliage buries the recesses of the forest in perpetual shade. Travelling is very difficult, owing to the thick growth of willows, scrub maple, juniper and devil's club. Devil's club! What an experience is devil's club! Imagine a bare stick an inch thick and five to eight feet high with a spread of tropical-looking palmated leaves at the top, set off by a bunch of bright red berries. The entire surface of the stick is covered by sharp, fine spines and the canes grow so close together that sometimes it is impossible to force a way through them without using an axe. The points of the spines break off in the flesh,

The Devil's Cane or Prickly Aralia. (*Panax horridus*, *Fatsia horrida*).

causing it to fester and become very painful. The classical name *Panax horridus* sounds appropriate. They grow most luxuriantly in damp spots, and are frequently found ready to lend a helping hand over fallen tree trunks, when you discover, to your sorrow, that appearances are deceptive. I am told that even devil's club has its uses. An enterprising druggist from Hamilton once went on a prospecting trip to the valley of Fish creek, a tributary to Arrow lake. I do not know if he found minerals, at any rate he found devil's club and, being a clever man, proceeded to turn it into gold. Shortly after his return, a new patent medicine appeared on the market entitled 'Ryckman's Kootenay Cure for Rheumatism.' It is, I understand, largely composed of the root of the devil's club.

Along the right-of-way, raspberries and salmon berries are found in the greatest quantities and, on the adjoining mountain slopes of Mackenzie and Cartier, huckleberries, sweet and luscious, are everywhere for the first thousand feet up from the valley. The neighbouring woods are, on this account, much frequented by bears, who are very fond of these berries and also of the roots of the skunk cabbage, a highly perfumed plant of tropical growth, found in great profusion along the low bottoms inundated by the Columbia river at high water. The railway company had lent us a hand-car with which we could proceed rapidly from one end of the base to the other. While travelling down the first day, we met a man in a great state of excitement. He had shot a bear and was wondering how he could get it up to the town. We took it up for him. Again on the last day of the measurement, the very father of bears was seen walking up the centre of the track and only turned into the brush upon hearing our shouts. Later in the season a third bear was seen along the base line.

August 15th, a flying camp was taken to timber line on Mt. Mackenzie and the tent pitched in a grassy valley about half an hour below the westerly summit. The following morning

at breakfast, a caribou, a royal buck, with the finest set of antlers I have seen, paid us a visit, approaching to within a hundred yards. For the sake of the trophy, I would have given much for a rifle. Unfortunately, there are so many things to be carried in the way of instruments and camping paraphernalia that a rifle is generally the last straw. We were compelled to be content with setting the dog on him and, even then, he went off slowly, at a pace little beyond a walk. That evening another was seen in the same locality. Owing to the smoke, photographic operations were much impeded and, in the direction of the Columbia valley, were useless. I managed, however, to obtain transit readings upon the signals at each end of the base, as well as upon those to the east. Having set signals upon both peaks, we closed the work and returned to main camp. The two peaks were, I believe, known as the Twin Buttes and have since been named Mts. Mackenzie and Tilley. This is scarcely correct, for in reality there is but one peak, the most westerly point of elevation (Mackenzie) being only a spur or shoulder extending from the highest point, although from the valley below they have the appearance of two distinct points. The higher, we recorded as 'Mt. Mackenzie,' altitude 8,064 feet, the lower as 'Mackenzie Shoulder,' altitude 7,718 feet. The altitude of the railway at its base is 1,434 feet, leaving a climb of 6,630 feet to the loftier summit, within 50 feet the same height as the summit of Mt. Sir Donald from Glacier House, and much more tiring.

The last station occupied in this vicinity was Mt. Cartier, a commanding peak, five miles to the south, overlooking the Columbia valley. The condition of the atmosphere was even less propitious than when on Mt. Mackenzie, and I did not obtain readings upon the base signals, owing to the dense belt of smoke filling up the valley. However, photographs to the eastward were taken and a signal erected for use from the base. The proceedings were enlivened on the morning of the 22nd,

Denizens of the Mountains and the Plains.

when, on reaching the crest of the ridge, a herd of goats were sighted on the snow at some distance. This time a rifle was at camp and was soon brought up. We watched George do the stalking. Having been in South Africa he was selected as the surest shot, for we were very desirous of obtaining some fresh meat. He was successful; two kids and two old ones fell before him. Of these the two kids and one yearling were taken down to camp, of the other merely the horns. The flesh was found excellent and a pleasant change from the usual camp fare of salt breakfast bacon.

The smoke, which was growing more and more dense, prevented reading the angles at the respective ends of the base, so it was decided to pack up and start for Rogers pass summit, returning to complete the work here at the end of the survey. In the small hours of the 27th of August, the car containing our ponies, outfit and party was dumped on the side track at the summit of the Selkirks. It was pleasant to gaze upon the pure white snows, the sharp-cut cliffs and soft blue-green stretches of timber after the dust, smoke and ashes of the Columbia valley. The monarchs of the pile were all around, and the only question was, where to begin. Camp was pitched in an open grassy spot dotted with small spruce, at the actual summit of the pass and the ponies turned out to feed to their hearts' content in the stretches of meadow-land, that reached for half a mile towards Rogers Pass station.

It was decided to ascend something easy for a start, so Mt. Avalanche was selected and preparations made forthwith. The following morning, four ponies were loaded with packs, and all hands, except the cook, travelled down the railway track and took the main trail immediately north of the Illecillewaet crossing. The path is on an easy grade and excepting a few fallen trees, which a couple of axes, wielded by brawny arms, soon disposed of, no difficulties were encountered. A steep bit was met with just below the rock-strewn amphitheatre bounded

by Avalanche crest, Avalanche peak and Eagle peak; but the ponies, accustomed to climb anything short of the perpendicular, soon surmounted this. We had scarcely set foot in the basin, when a startlingly shrill whistle announced our arrival and was repeated again and again at intervals around the whole circle. The hoary marmot or whistler, the sifflcur of the old Hudson's Bay Company's explorers, is well known to all travellers in the Rocky mountains. They are of all sizes, from a full-grown weasel to a badger, and the shrill call, echoing among the hollows of these vast solitudes, has a distinctly weird sound. The skins have no marketable value, there being no fur, or else they would not abound in such quantities. I believe the Kootenay Indians, before the advent of the white man, used the skins for purposes of clothing. Whole families may be seen disporting themselves upon one huge boulder and, be it early or late, you cannot move in any direction without the note of warning being sounded. They are not by any means unpalatable, when well cooked. We tried one that evening and found it good eating.

The same afternoon, I went up to Avalanche crest, selected a good station at an altitude of 7,835 feet and obtained my first views of the noble array of peaks, glaciers, snow-fields, valleys and streams surrounding us. Thousands of feet below, could be seen the white tents at main camp, the long line of snow-sheds, the trestle-work of the Loop and the sun shining on the winding Illecillewaet, till lost in the indistinctness of the haze and smoke, with which, I regret to say, the landscape was still dimmed.

Next morning, the westerly of the twin peaks of Avalanche was occupied, reaching the same by an easy tramp over a snow-field and then a climb up the rocks. The whole panorama of the Hermit range was before us and, beyond to the east, the Beaver valley, the Prairie hills, the deep shadows of the Columbia and dimly, in the smoky atmosphere, above the towering outline of Mt. Macdonald, the snow-caps of the Rockies. Look-

Hoary Marmot, Whistler or Siffleur (*Arctomys Columbianus*).

ing southerly, in dusky array: Eagle, Uto, Sir Donald, the shadowy outlines of Dawson, Deville,* Fox and Donkin, and sharp-cut against the sky-line, the great escarpment of Mt. Bonney. How hateful was this smoke that deprived the views of the detail and vim that was the essence of the map work! That afternoon, we followed the arête joining Avalanche to Eagle peak and descended the snow slopes of its eastern face, crossed the névé filling the basin lying to the east and north of Avalanche, Eagle, Uto and Sir Donald, and occupied a station on the northern ridge overlooking the Beaver valley and the great gulch between that ridge and the long timbered shoulder extending easterly from Macdonald. The altitude is 8,682 feet. The station furnished an excellent view of the north face of Sir Donald; it did not appear to offer a good point of attack from this quarter, the sides rising in sheer precipices from base to summit. The glaciers at the outlet of the névé descend to the Beaver valley, and are small and cramped.

It was decided next to tackle Sir Donald. The smoky condition of the atmosphere was highly detrimental, but it was uncertain how long such a state of things would continue, and owing to the central and exalted position of the peak, it was necessary that a definite reference mark should be placed at the summit. We rested quietly on the morning of the 30th, preparing for the ascent on the following day. A light flag pole was made from a piece of dry fir, intending to plant a white cotton flag for reference. The party stayed the night at Glacier House so that no time should be lost in the morning. It was necessary to make the trip in one day, and probably three hours would be consumed at the top in photographing and angle reading; so, in addition to my own two assistants, I decided to take the two guides Edouard Feuz and Charles Clarke, as then no time would be lost in picking out a path for the ascent. I

* Now 'Selwyn'

think also, I felt a little bit dubious; indeed, to gaze from the hotel at the apparently perpendicular walls of the great mass, for one who has had but a short experience and has not previously felt the way, there is a cause for doubt. Over-confidence is apt to lead to uncomfortable results. Mrs. Young tells of a certain man, who going up on the glacier, scorned to take a guide, and when urged to do so and warned that it was decidedly dangerous to climb alone on the ice, replied loftily, 'My good woman, don't worry your worthy soul about me. I am not an infant. If you wish me to pay for a guide, I will do so, but I absolutely refuse to take one.' Several hours later he returned, wet and indignant, marched straight to the office and ignoring all previous conversation, exclaimed with much heat, 'Madam! you do very wrong to send any one to that infernal glacier without a guide. Why! I slipped and very nearly fell into a crevasse.'

We were up soon after 2 a.m., had breakfast and were on the way by 3.30. The ascent was made by means of the small glacier on the southwest front. Some time was lost in cutting steps up its face. It was the usual route followed during the past summer. (For description see under 'Mountaineering.') Up to a short distance beyond the spot where danger from falling stones is incurred, we had not used the rope; it was now suggested that it be left behind, as better time could be made without, and the more difficult portion of the rocks was past. At 10.15 a.m. the summit was reached. The time was little better than that usually made, but we had our camera, transit and flag pole at the top. Immediately, flash signals from the tower below announced that we had been seen through the telescope, placed there for the use of intending climbers.

Unfortunately, the day was quite the most smoky we had experienced. The peaks close at hand showed like grim spectres and the more distant as shadowy outlines, vanishing into obscurity. The valley of the Beaver and eastward was a blank. The views, however, were not all lost and some have turned out

much better than expected. Angular readings were obtained to a number of the surrounding peaks, notably: the cairn built by Herr Carl Sulzer on the highest of the Swiss peaks in 1890, the signals placed on Avalanche, Avalanche Crest and at Beaver River West station; also on the summits of Mts. Macoun, Dawson, Bonney, Green, Cheops, Grizzly and Eagle peak. On Grizzly a cairn had that day been built by two gentlemen, who had made the first known ascent.

The return was begun at 3.10 p.m., and the rope reached without mishap. Personally, I should have wished to complete the descent without using it, but the other members of the party desiring to avail themselves of the confidence inspired, it was attached. It was, perhaps, as well we did, for while descending the ice slope near the forefoot of the glacier, one of the party lost his footing and started on an involuntary glissade down the ice, to be promptly brought up at the end of the tether. In bad places, it is much easier to ascend than to descend, when the law of gravitation has a very potent influence. We had just reached the foot of the glacier when a mass of ice, weighing tons, broke away and came crashing by, a hundred and fifty feet distant. Some of the pieces took enormous leaps through the air, moving with tremendous velocity. We reached camp at 9.30 p.m., having been steadily on the go, inclusive of the work at the summit, for twenty hours.

The elevation of Sir Donald above sea-level is found to be 10,808 feet. This is the mean result of seventeen angular readings from and to other points, which have since been computed. It is referred to rail-level at seven different places throughout the entire length from the base, south of Revelstoke, to Mountain creek in the Beaver valley. The compilation of Mr. J. White, Geographer to the Department of the Interior, has been used as a medium of reference to sea-level. In the appendix will be found a list of his elevations for some of the known points

along the railway through the mountains; also a copy of his profile of the line from Winnipeg to Vancouver.

On September 3rd, an unsuccessful attempt was made to occupy Swiss peak. The Rogers Pass station agent had placed a hand-car at my disposal, and with it we quickly ran down to the old site of the station, a mile distant, prior to its being swept out of existence by an avalanche. The morning was peaceful and bright, as though clouds and rain, fierce snow storms and all-powerful avalanches were facts unknown. An easy climb, though somewhat encumbered by fallen timber and the usual impedimenta, took us to the crest of the amphitheatre lying between Mts. Tupper and Grizzly. There are three fair-sized glaciers and one small one tributary to the basin. It is evident that at one time they were united and filled the whole of it, flowing over the crest and down the slopes to the bed of Bear creek. The old moraines at a considerable distance from the present forefeet of the glaciers and the rounded, ice-worn condition of the rocks furnish ample evidence to this fact. Although well into September, it was here early summer and the flora in full bloom. Yellow lilies first seen in the vicinity of Glacier House, early in June, now flowered luxuriantly in the hollows between the lateral ridges of rock which rib the amphitheatre.

Having pitched a tent and had some lunch, we ascended the most easterly glacier, following it to the névé, and from thence climbed the right-hand ridge of rock leading to the summit of Mt. Tupper. A high point, overlooking the valley on both sides of the summit, and also permitting a good view up Bear creek towards its source, was occupied at an altitude of 8,568 feet. It has been recorded as "Tupper Crest." It was intended to ascend Swiss peak the next day, but during the early morning hours it commenced to rain, turning to snow and sleet. After eight weeks of unparalleled fine weather, it had broken, and from now on the work was uncertain. At 2 p.m. we returned to main camp, leaving the tent and outfit, instruments, etc., up there.

September 5th was cold and disagreeable; the mountains, covered by the newly fallen snow, were for the most part in clouds; climbing was out of the question, so with the full party, we ran down to Bear Creek station on the hand-car to erect a signal at that point. The strike was now over and the road crowded with men repairing the snow-sheds and generally making up for lost time. A short distance beyond shed No. 1, a sign-board presents the information, 'Bear Creek 1 mile.' As we emerged from the tunnel and bore down upon the sign, a bear broke from the bushes and crossed the track about twenty yards in front of the car and the same distance from the sign. Bear Creek was one mile, but here was the bear. In a fine brogue, George yelled, 'Sthop the car-r and git a rock.' The car was stopped, but by the time a suitable rock was obtained, the bear was some distance down the slope.

Before returning, the signal having been erected, I made inquiries of the agent at Bear Creek station as to whether any trains were on the way down and was told that the line would be clear for the next two hours, more than sufficient to reach camp at the summit. We had arrived at shed No. 2 and were half way through, when a man was seen silhouetted against the opening at the farther end, frantically waving his arms. His meaning seemed plain; that something was coming down the line. To stop the car on the up grade, jump off and lift it from the rail was the work of a few seconds, when we found to our horror that there was not room between the track and the side of the shed. At this moment an engine from Rogers pass entered with a blood-curdling whistle. We were still struggling with the car as the engine stopped, thirty feet away. Fortunately, it was a light engine going down to Beavermouth to push a freight up the grade to the summit. Had there been a heavy train behind—well, something would have been smashed.

September 6th, with an assistant, a return was made to the camp in the amphitheatre below Swiss peak, having first sent

to Glacier House for the guide, Edouard Feuz. Everything was found as left, provisions included, and without stopping we continued up the moraine, on the right-hand side of the most easterly glacier, to the névé, crossed the same and ascended to the rock ridge extending westerly from Mt. Tupper towards the Swiss peak; we then traversed the upper névé, which is the source of a glacier that feeds the creek descending to the Beaver river near Bear Creek station, and ascending the southeasterly arête from Hermit mountain, selected and occupied a prominent station overlooking the Beaver valley and the signal at Bear Creek station, erected the previous day. The north face of the ragged points of Mt. Tupper were in full view and beyond appeared the summits of Mts. Macdonald and Sir Donald. On this side, the Hermit had dropped his cloak of humility and presented rather the appearance and dignity of a cardinal. Hermit peak is easily attained by means of a snow arête leading to the rocks near the summit. (See view.) The station was named Hermit Crest, altitude 9,010 feet. Edouard Feuz and one other man were found at the camp upon our return.

The following morning the clouds were down over the Swiss peak, but the day was fine and promised to be clear; so at 7.40 a.m. we started, ascended the Rogers or easterly glacier, and skirting a number of crevasses crossed the névé and travelled up a steep snow slope to the couloir immediately to the east of the highest of the three central peaks—Swiss peak. As the ground was new to us all, the guide included, the rope had been assumed on reaching the glacier. The bergschrund presented little difficulty, but the snow couloir was a nasty bit, the lately fallen snow on the previous hard crust making the climbing treacherous. The couloir carried us to the col between the easterly and central peaks. From this point the rocks were bad in places but did not last long, and at 12 o'clock, we stood beside the stone cairn erected by Capt Sulzer of the Swiss Alpine club in 1890. There seems to be no record of the peak having been climbed since then, until the present date; although, at Beaver

Hermit Mountain from Hermit Crest

mouth a few days subsequently, I met a prospector, who was washing gold on Quartz creek when, having mentioned that I had just ascended Swiss peak, he remarked: 'Is it that little peak over there?' jerking his thumb over his shoulder. 'Why, I was up that five years ago.'

Although the clouds had risen to some extent and were clear of the peak, they still hung over the mountains to the north, across the deep valley of Mountain creek. The valleys were in deep shadow and a good deal of smoke still dimmed the landscape; I was, therefore, unfortunate in the quality of the views taken. However, trigonometrical readings were obtained with the transit and the position and altitude of the station established. Its elevation above sea-level has been deduced from a series of readings as 10,515 feet.

Mountain creek valley is one of much interest: huge spurs, clad with dark green spruce and fir, jut into it from both sides, and several large glaciers and snow-fields sweep downwards from the Hermit range, disclosing some enormous transverse cracks. In the valley bottom, several patches of open meadow were noticed. It is well worthy of exploration and, from appearances, I should judge that an easy pass may be found to the headwaters of Cariboo creek, and thence to the Illecillewaet valley below Ross Peak siding; provided that such a pass is not already known to exist. The work was completed at 2.30 p.m. and camp reached at 5.30. Leaving the tent and outfit to be brought down later, we returned to the main camp, reaching it some time after dark.

From the 9th to the 17th of September, the weather was broken, clouds and drizzle being the general order of the days. Notwithstanding these drawbacks, a trip was made with the hand-car to Beavermouth and a station occupied immediately south of that place, altitude 7,251 feet. It presented views of the western slopes of the Beaver valley and mountains beyond, in so far as the clouds would permit. A second station

across the river, opposite Surprise creek, altitude 5,939 feet, was occupied on the 14th, but the clouds were low and the views not very successful.

At the foot of the slopes on the east side of the river a bear trap was seen—a live fall—around which were scattered the bones of three bears. These animals seem to have been, and still are, very plentiful in this vicinity: probably due to the fact that the Indians seldom hunt here. It is said the Indians have a superstitious fear of the Illecillewaet valley, and think it is haunted by bad spirits. What is far more likely is that, owing to the dense forests and heavy windfalls, they find travelling too difficult, and hunting without ponies to carry the game, a work of too great labour. It is certain that in the Rockies to the east, where ponies can be taken almost anywhere, they hunt continuously, and have very greatly reduced the quantity of the game.

Two stations were established above timber line on the long, heavily timbered shoulder extending easterly from Mt. Macdonald, with the object in view of covering more efficiently the Beaver valley than had yet been done. We did not imitate the Rev. W. S. Green and attempt to take up a pony, but contented ourselves with a one-day trip and packed the instruments on our backs. As far as I could judge, the summit can be reached from this shoulder. The altitudes of the stations are respectively 7,595 and 6,990 feet.

On the 18th, 19th and 20th, we climbed to and occupied stations upon three minor points around the Roger pass summit, viz.:—Napoleon, Mt. Grizzly, and the northwest corner of Mt. Cheops. Napoleon is a spur extending east and south from Mt. Cheops. At its northern extremity is a detached rock bearing, from a distance, a striking resemblance to the 'Little Corporal.' All three were easy climbs, presenting the usual features of tangled bush, grassy alps, snow-slopes and rock. To reach Napoleon, an ascent was made directly from the summit

Grizzly Bear (*Ursus horribilis*, Ord.)

of the pass to the amphitheatre below the pyramid of Cheops and between Napoleon and the shoulder extending easterly along Bear creek; then up the perpendicular cliffs from which the figure of Napoleon stands out. The altitude of the station is 7,737 feet. The views were good and the panorama is reproduced in volume II. (plates and maps).

The easiest route to Mt. Grizzly is along the bed of Bear creek for about one mile and a half; then, up a watercourse to an amphitheatre below the southeast face. Ascending the watercourse is much like going up stairs. The climb presents no difficulties and can be easily made from Glacier House in one day. The view in every direction, particularly of Mountain creek and the portion of the Selkirks lying to the north of that stream, is grand beyond description. By keeping to the bed of Bear creek, the heavy jungle on both flanks is avoided and rapid progress can be made. A path leads from the engine-house at Rogers pass station for a short distance up the creek to a point where a dam has been built in connection with the water supply to the tank below. The altitude of the highest point of the mountain is 9,061 feet.

Bear creek was explored to its head, with the intention of making an ascent of the peak immediately to the north of the divide between that stream and Cougar creek, until recently known as Mt. Roy. Broken weather, however, compelled the easier climb to the northwest corner of Mt. Cheops, situated at the south extremity of the divide, 8,317 feet above sea-level. From here, a traverse along the arête, forming the chisel edge of the mass, takes you directly to the pyramid and would be a comparatively easy path. An excellent one day trip can be made from Glacier House by travelling up the creek to its head, then to the crest of the divide between it and Cougar creek; now, turning to the south east, an easy ascent is made to the northwest corner of Cheops and along the arête to the pyramid, descending by the long southern slope to the 'Loop,' and home

along the railway. The central position of Mt. Cheops makes it a particularly good point of observation and, although not so high as some of the master masses, its 8,506 feet of altitude enables you to sweep the circle of peaks in every direction and obtain a better knowledge of the variety and topographical character of the area than can be had from any other point: To the west and north, the rotation of glaciers fronting on the Hermit range; below, the village of Rogers Pass, the railway and rows of snow-sheds curving down the grade to Glacier; the Sir Donald range in minute detail; the Illecillewaet glacier and névé; beyond, the distant masses of Dawson, Fox and Donkin; continuing the circuit, the glacial basin of Mt. Bonney with the 'Loop' curving at its entrance; then, twenty miles or more of winding, shining river with the Albert peaks prominent in the distance; and lastly, the basin of Cougar creek and the two high peaks at its head. It is not always well to be too exalted, a middle station enables you to mark and enjoy the lower but none the less interesting features, which are minimized and lost from a very great height. I am much surprised that this climb is not more popular. A made trail up Bear creek to the summit of the divide, then either down Cougar creek or from the summit of the pyramid of Cheops down the slope referred to would, I have no doubt, soon render the trip a general favourite.

The tramp up Bear creek is worth taking. The valley is wild and picturesque in the extreme; great precipices and rock-falls descend sheer from Mt. Cheops and immense masses of naturally quarried stone lie at its base; huge buttresses, clothed with dark pine, extend from the mountains to the north; silver cascades drip from great heights to the valleys below. It is the home of the bear, and everywhere paths made by those animals, through the alders and rank growth along the creek, are met with. In the valley, great isolated blocks of rock stand like islands, clad at their summits by clustering spruce; at their

Black Bear (*Ursus Americanus Pallas*).

base are caves, where bears make their dens, and all around is a playground, worn smooth, the flattened grass beyond showing where the family have been sunning themselves. As you pass one of these places and gaze timidly into a den, wondering if the occupant is at home, a shrill resounding whistle, almost at your ear, makes your hair stand on end and you spring back to see the very father of the whistler tribe sitting stolidly on a rock above you. Much relieved, you proceed on your way along the path up the creek through the alder scrub and skunk cabbage, which lies most invitingly open to you, troubled only by the thought 'What if Mr. Bruin and his family should be taking a walk from the opposite direction.'

From the 23rd to the 28th was spent at Illecillewaet station and Laurie mining camp, but owing to rain, clouds and fresh snow on the upper slopes, only one ascent was possible. The point occupied is immediately north of Illecillewaet. It was reached by the trail spoken of by the Rev. W. S. Green as leading to Corbin's pass and was, in fact, immediately above that pass, to the west. The altitude is 7,083 feet.

The only other ascent made near the Rogers pass summit was that of Mt. Abbott, where a station was occupied on the crest of the long ridge, usually ascended from Glacier House, at an altitude of 7,710 feet. It is difficult to tell just exactly where the summit of Mt. Abbott is. As generally accepted, the mountain (so called) is the northerly end of a long ridge skirting Asulkan creek on the west side. The ridge rises gradually to an altitude of 8,081 feet. It is then connected by a snow col with a low peak named Mt. Afton, 8,423 feet. From here it continues rising to the Rampart, then to the Dome and finally to Castor and Pollux, where the greatest elevation is attained by the latter at 9,176 feet above sea-level. From the summit of Pollux, it falls again to the headwaters of Fish creek flowing from the Geikie glacier. The eastern face of Mt. Abbott, the southern face of the Abbott-Afton col and the

eastern faces of Mt. Afton and the Rampart are one continuous rock escarpment with numerous indentations and rock buttresses extending outward to the timbered slopes of the Asulkan valley. The hollows are filled by deposits of snow, which assume the form of glaciers as the Dome is approached. The climb was made on the 30th September and the heavy snows of the previous week rendered the travelling extremely disagreeable.

The guides had left Glacier House to return to their homes in Switzerland and the season for tourists was practically closed. I had intended making trips to Mts. Dawson and Macoun, but the bad, broken weather rendered it impossible for this season. From October 1st to the 5th, the weather remained fine and stations were occupied from Illecillewaet village, eastward; one south of that place at an altitude of 7,631 feet; one above Laurie mining camp, at 7,424 feet; one overlooking Flat creek to its head, 8,080 feet; and one on the ragged ridge lying immediately south of Cougar creek and north of the Illecillewaet river, commonly called Cougar mountain, at an altitude of 7,381 feet.

This practically closed the survey. On October the 8th, the bulk of the outfit, the ponies and two members of the party were sent east to Calgary. Taking the remaining two men and a tent, a return was made to Albert Canyon and the station first occupied again ascended for the purpose of obtaining angular readings upon the signals lying to the east of that point. When near the summit of the ridge, it commenced to snow and snowed all day, turning to rain in the valley. The attempt was a miserable failure. In addition, we had a thorough wetting and a scramble after dark down the mountain side over fallen logs, through rocky beds of streams, thick devil's club and tangled, steaming bush and bracken. Early in the morning, I had the misfortune to slip and sprain my wrist, which made this after-dark travelling still more trying. The day following we were again at Revelstoke and on the 11th, a beautiful Indian summer

day, obtained the angles at each end of the base, without further mishap.

Between Albert Canyon and Revelstoke, I had from time to time, as the occasion arose, walked over the road-bed and taken, with an aneroid barometer, the difference of elevation between the railway and the river at each mile post and crossing of the track. This had still to be done from Albert Canyon to Beavermouth, so on the 13th, 14th and 15th of October, I walked leisurely along the track taking final notes and barometer readings, and giving the last finishing touches to memory's scrap-book—a scrap-book replete with pictures that cannot but remain indelibly impressed; not only for their own wild grandeur and graphic representations under every phase of weather, but also from the historical associations connected with them and the memories recalled of the great and dauntless men with whom every part of the route is so closely connected.

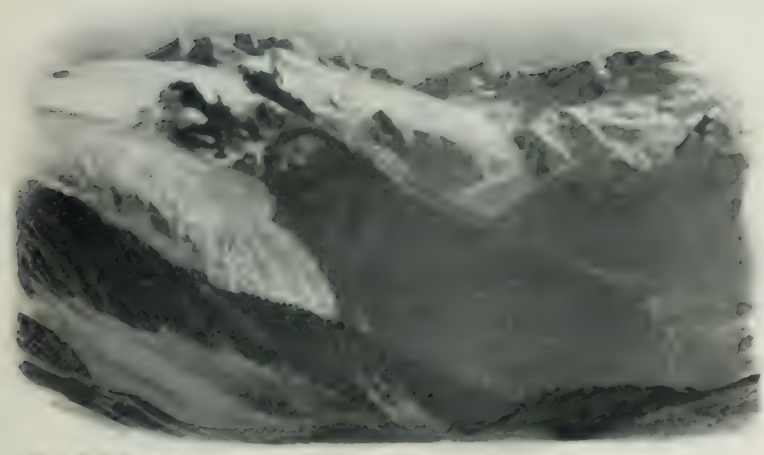
Not the least pleasant to meet in this last walk, were the many kind friends I had made during the work, men of humble station, employees of the road, but none the less, honest, good-hearted, hospitable fellows, who had helped me again and again to the utmost of their ability: The watchman at Laurie snow-sheds, who *would* put a piece of candle at the farther end of the sheds, so that, if perchance benighted, I should not have to travel through them in the dark; the Irishman at No. 1 shed, who treated his telephone as though it were deaf, and would, I believe, have pounded it with his fists if thereby he could have made it speak for us; then there was the watchman between Glacier and the Loop, with his pretty and artistically arranged rockeries and gravel paths of pure white broken quartz, which he guards most jealously and pathetically; and 'Mac,' at Surprise creek bridge, who had a garden full of beautiful flowers round his cabin, and a short distance away had carved an impromptu experimental farm from the hillside, where pansies and sweet-williams could be seen growing thickly through the

grass; again, the watchman at Rogers pass summit, who being asked if he were a switchman, replied, 'No, sir, I am a Swede'; and many other men equally interesting.

Of the management of the company over the Mountain Division, I cannot speak too gratefully; every possible assistance was given me by the courteous superintendent, Mr. T. Kilpatrick, and his able staff. A letter of instructions to freight train conductors, permitting myself, party and outfit to travel with them, was found very useful, and a letter of introduction to the several agents with whom I came in contact proved of much value. Mrs. Young, manager at Glacier House, is kind and pleasant to everyone and is liked by all, whether guests at the house or her staff of employees. Although not a regular guest, I experienced much kindness from her; she placed the guides at my disposal and went out of her way to assist me in many other particulars. I must not omit to mention the visit, on the 29th of September, of their Royal Highnesses, the Duke and Duchess of Cornwall and York, when passing through over the road. We assisted in the reception and added the weight of our voices to the hearty cheers that received and sped them on their way. A view of Glacier House in gala dress is here reproduced.

And so ended the season's survey. We fell short of the ground it was originally intended to cover, due partly to the withdrawal of my capable assistants, partly to wet and smoky weather. It was desired to extend it to the Fish creek valley and the region south and west of the Dawson range, also to include something of the Mountain creek valleys and the headwaters of Caribou creek, but it was found impossible to do so this year and became necessary to leave these portions over for another season.

Glacier House in Gala Dress.



From H. W. Greene.

Dawson Range, Illecillewaet and Asulkan Glacier.

CHAPTER III.

BEYOND THE SKY-LINE.

1902.

OWING to the desirability of mapping all the previously explored and travelled region of the higher Selkirk summits, it was decided to continue the topographical survey of the previous summer so as to extend the work beyond the sky-line of Rogers pass and of the valleys of the Beaver and Illecillewaet rivers followed by the railway on either side of it. Pioneer explorers and Alpinists had already, to some slight extent,

dipped into these more remote sections, and it was known that it was here the climax in grandeur of Selkirk mountain scenery was to be found. It was evident that so soon as facilities to reach these parts, in the shape of paths and shelter cabins, might be afforded, the number of mountain climbers and tourists visiting them would be great, and while at this work, it was considered advisable to obtain data to furnish a guide map that would serve the purpose for some years to come.

The problem involved was how to get camp supplies, provisions and survey instruments into the interior so as to enable the work to be carried on. The only trails known to exist in the vicinity were two in number: one up Asulkan creek to its head, made by the railway company for the use of visitors to Glacier House, and the other up Flat creek to connect with the Fish creek valley.

On the 30th July, 1902, camp was again established at the summit of Rogers pass, on the site of the previous year. It was the only known spot at hand where pasture could be obtained for the eight pack ponies. Two of the party, the ponies and outfit had been sent on in a box car by freight train three days ahead and, on the evening of the 29th, I arrived with my assistants. After the dry sunny weather of Alberta, it seemed quite refreshing and friendly, on stepping from the express at Rogers pass station, to find ourselves enveloped in a regular Selkirk mountains rain-storm. The box car, which had only arrived a short time before, stood on the siding at the summit, half a mile westerly from the station, and was still loaded, although the ponies had been turned out to feed. It was now decided to camp for the night in the car and to pitch the tents the following morning, when the rain should have ceased. A bundle of hay spread on the floor made a soft and luxurious mattress and we were soon rolled in our blankets, sleeping the sleep of tired excitement, soothed by the distant roar of the waterfalls from the glaciers of Mt. Rogers and disturbed only

Falls in the Asutkan Valley.

by the rush of a passing train. The next morning was bright and fresh after the rain and it did not take long to get camp pitched—a camp that, for the next three months, was to be our headquarters and a source of much interest to passengers on the daily trains from the east and west and to many of the visitors at Glacier House.

On the 31st, it had again rained during the night and was still raining at breakfast time. It looked like clearing, however, so the survey instruments and some provisions were loaded on a pony and a trip made up the Asulkan trail to the crest of the glacier. It was desired to locate a suitable spot for a supply camp, when the work should be pushed into the interior by way of the Asulkan pass. The trail is well made on an easy gradient, rising some 2,150 feet in three and three-quarter miles to a spot where a supply tent was subsequently placed. Beyond this point, the way lies over the ice of the glacier and snowfield beyond, and an additional rise is made of 1,475 feet to the summit of the pass, which is crossed at an altitude of 7,710 feet. The total distance from the hotel to the summit is very slightly greater than five miles.

The Asulkan valley is a gem of mountain scenery. About a quarter of a mile from Glacier House, the trail branches from the main path to the Illecillewaet glacier—a sign board at the junction pointing out the way—and winds for a space through a most beautiful forest, where giant fir, cedar and hemlock grow so close together as to cause a perpetual gloom broken here and there, in bright weather, by shafts of sunlight. A luxuriant growth of underbrush walls in the path, the bushy sides being laden, during the latter part of the summer, with luscious huckleberries and rendered especially attractive by the tropical spread of the bright green foliage of the prickly aralia (devil's club). Leaving the forest, the stream is crossed by a log bridge and is followed by the path along its eastern bank: now through woods of spruce bordering the margin and at some

height above it, again at the very edge, almost in touch of the rushing, swirling waters. Frequently through openings in the timber, the black rock walls of Mt. Abbott, the Rampart, the Dome and the snow-clad heights of Castor and Pollux come into view, overhanging the valley on the west and showing, on a sunny day, like a chrome against the azure sky. Here and there are clearings where waterfalls, fed by the snows on and at the base of the summits named, may be seen to tumble in sheets of spray over the precipitous ledges above the stream and fall hundreds of feet to join the torrent below. In one spot as many as seven separate falls may be counted. The valley feels enchanted. There is magic in the atmosphere. The feeling is intensified by the roar of rushing waters, which is always in your ears; now faint as the path enters some woods and their density deadens the sound, then filling the whole air as the torrent sweeps at your feet.

At the upper end of the valley the trail rises high above the creek and has been cut from the mountain side. Here, the tongue or snout of the Asulkan glacier comes into view, partly buried in the piles of rock, mud and boulders forming its terminal moraine, an accumulation borne down and deposited by the glacier through the course of ages. Above, to the right, are terraces of ice and snow, cracked and seamed in every direction by yawning crevasses; to the left rise the rock precipices confining the Illecillewaet névé, the snow cornices with which they are crested showing how ready is that lake of snow to overflow its bounds.

The path now meets a branch stream near the head of the valley and, crossing it by a second log bridge, leads up a series of grassy slopes and timbered ridges, intersected by rock-slides, to the crest of the glacier. It is a home of the whistling marmot and numbers of these little animals are seen among the rocks, welcoming you by their shrill calls. They are very tame and probably accustomed to seeing visitors daily.

EAGLE PEAK, SWISS PEAK AND HELMET MOUNTAIN

At the head of the valley, to the left of where the trail makes its final steep ascent, an isolated rock stands out prominently from a surrounding bed of snow. It has been named 'The Ichthyosaurus,' and the name seems appropriate; for, although the rock bears no sort of resemblance to that extinct marine monster, yet there is something about it that naturally falls in with the suggestion.

It rained at intervals all morning. After some lunch, the party ascended to the ice of the glacier, tramped through the slush and streams of water with which its surface was covered, descended to the trough of the snow-field and, picking their way among the crevasses, reached the summit of the pass. We now gazed into the gloom-filled depths of Fish creek* valley at its northeasterly source. Below, at the foot of the south slopes of the pass, flowed the Geikie glacier, and across the valley could be seen the dirty, green ice of the Dawson glacier, burrowing its nose in the piled-up débris of its own terminal moraine. Of the mountains little could be seen. Drifting billows of vapour hid them from view. Now and then, a break in the clouds would reveal snow masses and sharp rock peaks, apparently in mid-air. The little that could be seen was far more awe-inspiring than an unclouded view, for the heights seemed impossible of attainment and the depths unfathomable.

At the end of the trail, the railway company has built a so-called shelter. It had no roof and was much cramped; moreover, it was built on the slope of a hill and the floor had not been levelled; so we stood in the rain around a fire and finally returned to camp in a wet, bedraggled condition, having only accomplished an exploration of the valley and pass. With regard to the shelter, there would seem to be little need for it where it has been built. It is an easy one-day trip from the hotel to the summit of the pass and back, and several hours can readily be spared at the summit, or for loitering in the valley.

* Incomappleux river of the Shuswap Indians.

It was now intended to make a flying trip up Bear creek in order to occupy some of the high points along the Hermit range. Two points had been occupied the previous season, one on Swiss peak and the other on Mt. Grizzly. At the former, the views had been very poor owing to smoke. A camp had then been taken up Bear creek to occupy the peak at its head (formerly known as 'Mt. Roy'), but, owing to bad weather, the project failed. There is no made trail up the creek, although it would be an easy matter to make one, so on the 2nd August, tents, provisions, blankets and instruments were packed in bundles, shouldered by their respective carriers and in single file we started, keeping close to the margin along the right bank. The distance from Rogers Pass station to the summit of the divide at its head is three and a quarter miles. Camp was pitched directly on this summit.* It is a lovely spot, consisting of stretches of park lands with rock outcrops here and there. The valley of Bear creek lies to the east and that of Cougar creek to the west, each of a different and distinctive type. The ground is thickly covered by pink heath and white heather. On the westerly slopes, close to the summit, there is plenty of wood and water and an excellent site for a shelter cabin may readily be found, to accommodate those desirous of visiting so beautiful a spot and of climbing some of the many accessible peaks in the vicinity. At the time of our ascent, the east slopes of the divide were very thickly covered by *Erythronium giganteum*—a giant yellow dog-tooth violet, which grows very profusely in the Selkirks and may be seen from early in June till late in August, according to the elevation.

We were camped here until 6th August. During that time, three ascents were made: on the 4th the most easterly of the two high peaks on the north side of Cougar valley was occupied with camera and transit. The altitude of the summit is 8,956 feet. The station is referred to as 'Cougar Creek North.'†

* It is proposed to name the divide "Bolan Pass."

† The name "Cheadle peak" is suggested.

Photo. A. W. Mitchell, Bulbs.

ERYTHRONIUM GIGANTEUM. HOOK.

On the way up, we disturbed a flock of wild goats from their pasture land along the side of the valley. There were five full-grown ones and two kids. The flock divided, four springing up the ridge in front of us and three of the old ones turning to the left and taking the side of what seemed a perpendicular snow face. They moved along very leisurely and, apparently, very carefully. Then, for some reason or other, one of them stopped, turned round, contemplated for a while, retraced his steps and coming straight towards us eventually disappeared over the crest of the Hermit ridge but a short distance away.

The westerly and higher peak, we ascended and occupied with the camera the next day. We called it "Cougar Head."* The altitude is 9,096 feet. Both peaks are prominently in view from Mt. Abbott and the observatory near Marion lake. To reach the latter, it is necessary to descend nearly to Cougar creek, as there are a number of spurs projecting into the valley with precipitous western rock-faces.

Both peaks afford interesting climbs. They are reached by scaling very steep slopes of snow. The snow being in good condition, little danger or difficulty was experienced. The nearer may be reached in three hours and the more distant in five hours from a camp at the divide. They command, in addition to several branches of Mountain creek, the divide between Cardiac creek and the north branch of the Hhecillewaet river, and permit of a view for some distance up the latter stream. Twenty glaciers were counted to the north and west: three in particular, on the north branch, being of large size and specially attractive. From the centre of the nearest one rises a sharp pinnacle of rock, which is seen prominently from many points. This we named "Fang Rock"; altitude, 9,507 feet. At the head of the Hhecillewaet branch could be seen a number of fine isolated peaks, ten of which are over 9,000 feet and at least

* The name "Mt. Rogers" is suggested.

three reach to 10,000 feet. The more that was seen of the region surrounding this stream, the more attractive it appeared and the stronger its claims to be included in the area of high Selkirk peaks worth visiting. It is not likely, however, that much will be done in this direction until a summer hotel is built at Albert Canyon village.

On the 6th, the summit of the peak formerly named 'Roy' was occupied at an altitude of 8,930 feet. The name 'Roy' has been dropped by the Geographic Board, as also that of 'Sulzer' for the next high peak to the east. It is now suggested that the first be known as 'Ursus Major' and the second as 'Ursus Minor.' Mt. Grizzly lies immediately to the east. From a camp on the Bear creek divide (altitude 6,700 feet), the summit of Ursus Major can be reached by a simple rock climb in an hour and a half. It shows much of the previous views and, in addition, overlooks the main valley of Mountain creek and the huge buttresses extending northward into it from the Hermit range. Immediately below the peak on the east side, an easy pass gives access from the head of Bear creek into the valley named and would doubtless prove a much better approach than by following the creek bottom from the railway crossing near the mouth. It is suggested that it be named 'Bruin's pass.'

The alpine flora of both Cougar and Bear creek valleys is simply magnificent, but particularly that of the former, where an endless variety of flowering plants seemed to abound. In no other spot were flowers found in such profusion and beauty. Several fine cascades are seen on the north side of Bear creek, and one on Cougar creek is reported to be worth a visit. A made trail, upon which ponies could travel, up Bear creek and a return by way of Cougar creek, would soon become a popular round trip and would well repay the exertion entailed.

After three days' steady climbing, it was necessary that the party should have a rest, the more particularly that, as yet, we

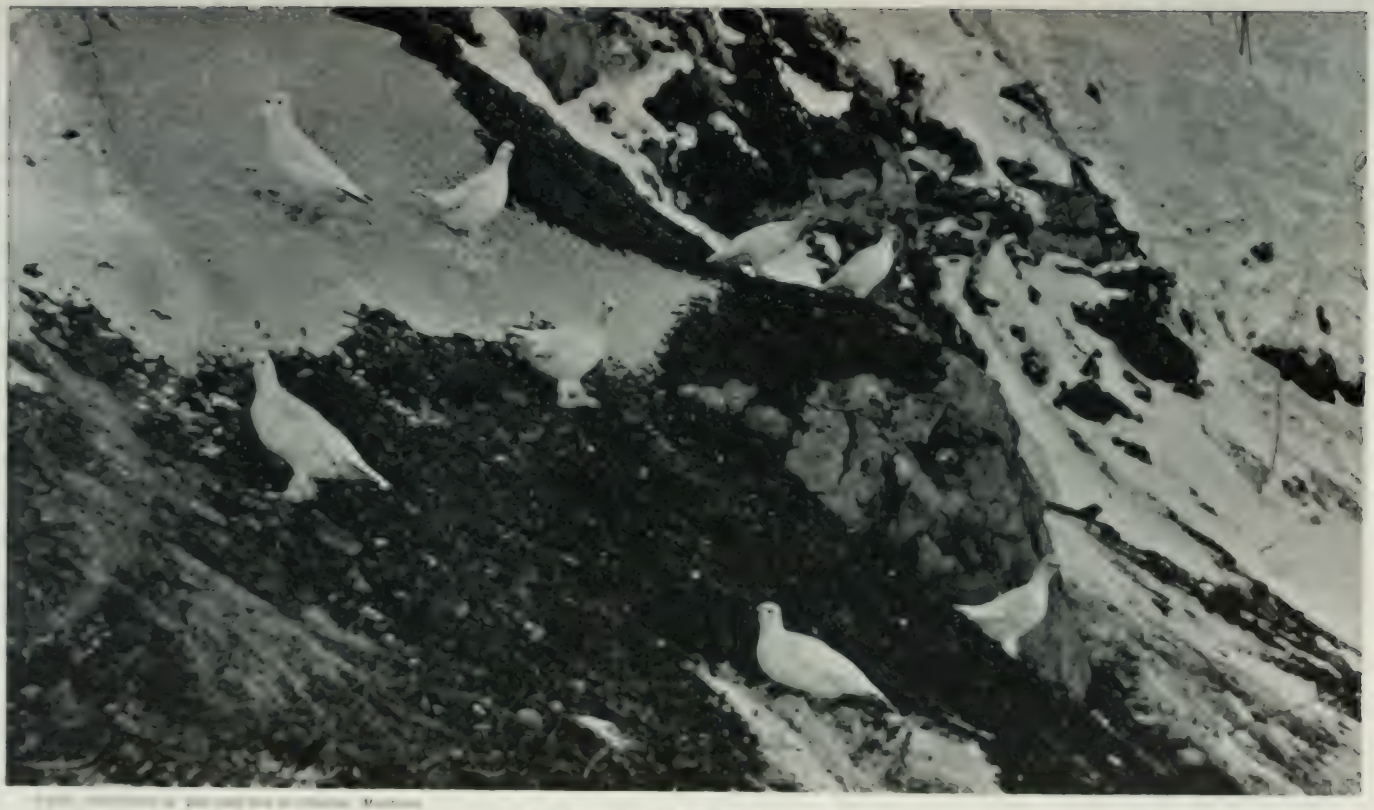
were not fully hardened to the work. So the packers were sent with the ponies and loads of provisions to establish a supply camp at the head of the Asulkan trail. Meanwhile, I went down to Glacier House and developed some duplicate plates, to see how things were going.

Here, I met Mr. H. G. Peabody, the well known lecturer upon North American scenery. He is an expert in the art of scenic photography and all his lectures are illustrated from his own camera. Through the courtesy of the Detroit Photographic Company, in whose interests he was spending some time in the Selkirks, I have been able to present in this report reproductions of a large number of his beautiful views. The company named have a choice collection of magnificent photographic views taken by Mr. Peabody in the Rocky and Selkirk mountain ranges and sell them at very low prices.

On August 8th, a hand-car was borrowed from the agent at Rogers Pass, and a camp outfit and supplies run down to the site of the old station. Following the route of last season, the outfit was then packed to the amphitheatre below Mt. Rogers and a camp established on very nearly the same spot. Next day, we made the ascent of Rogers peak, the most westerly one of the mass known as Mt. Rogers. This mountain comprises three component parts. The western is named Rogers peak, altitude 10,536 feet. The central consists of three distinct peaks: the highest or eastern, Swiss peak, is 10,515 feet in altitude; the middle one, it is proposed to call 'Fleming peak,' altitude 10,370 feet, and the western 'Grant peak,' altitude 10,216, to commemorate the meeting of Sir Sandford Fleming, the late Dr. G. M. Grant and the late Major A. B. Rogers at the summit of the pass beneath, in 1883. The eastern part consists likewise, of three sharp points. These it is suggested be named 'Truda peaks,' in recognition of the first lady to ascend Mt. Rogers and Swiss peak—Miss Gertrude E. Benham, of London, England.

We followed the route taken by Abbot, Thompson and Little in 1896, at which time the first ascent of Rogers peak was made, viz.:—up the Rogers glacier and névé to the foot of the small arête leading to the main southern arête. On reaching the crest of the latter, instead of taking to the snow on the eastern side, as they had done, we kept along the western face and ascended to a point not far from the summit by a rock chimney. This part was bad, owing to rotten rock, but fortunately we had brought a rope and, by its assistance, successfully accomplished the dangerous bit.

The views obtained from Rogers peak fully compensated for the poor luck at Swiss peak the previous summer; north, south and west, in bewildering confusion, as far as the eye could reach, rose snow peaks and rock peaks innumerable; their arms, reaching out in every direction, enfolded countless snow-fields and glaciers. Westward, the white, snow-capped line of the Hermit range stretched below this its highest point. Looking south, the two most striking features were the black, stunted mass of Mt. Bonney and the sharp solitary peak of Mt. Sir Donald. Between, lay the valley of the railway, and beyond, the snow world of the back ranges. Eastward, across the dark timbered swells of the Beaver and Columbia valleys, rose in the distance another system of snow caps, snow fields and glaciers, still more extensive and far-reaching than the one nearer at hand. Northward, across the main valley of Mountain creek, a number of isolated high peaks attracted our attention. They seemed to be as high and higher than that on which we stood. The altitude and distance of two of them have been computed. One, a little west of north, is twenty-seven miles distant, according to angular readings taken upon it from points over five miles apart, and rises a square massive form topped with snow to an altitude of 11,634 feet. It is the highest peak yet determined in the Selkirk range and is probably situated not far from the head of Gold creek. It is suggested that it be named



PTARMIGAN IN WINTER PLUMAGE

Mt. Sir Sandford in honour of Sir Sandford Fleming, K.C.M.G. The other lies still further to the west and apparently rises immediately across the valley of Mountain creek. It is, however, twelve miles distant and reaches an altitude of 10,618 feet. The peak is easily recognized by its elongated structure and black precipitous face. The ascent from the camp to the summit of Rogers peak took four and a half hours.

The next morning, we were off again before 7 a.m., with the object in view of ascending Mt. Hermit. It was desired to obtain a series of views to go with those of Rogers peak. The route lay up the ice of the Swiss glacier and across its névé. Then over the crest and across the Tupper névé to the foot of the berg. We tackled this from the col between it and Mt. Rogers. The first two hundred feet of rock presented some difficulty, owing to nearly vertical slabs with hand and toe holds too far apart to be reached. By the help of the rope, they were overcome and the ascent became easy until within 150 feet of the top. Here, precipitous rock faces blocked the path. It had taken four hours thus far and was now 11 o'clock. The best light of the day would soon be gone and the question before us was: were we mountaineers or topographers? Alas! duty compelled a decision in favour of the latter, and as the little platform on which we stood commanded a grand view of the country required, we reluctantly gave up the summit. The altitude of the station is 10,052 feet and that of the summit 10,194 feet. The landscape before us covered the easterly portion of Mountain creek valley and, likewise, swept the Beaver valley, where, as though laid out on a map, were seen the tortuous windings of the river. But, most interesting was the view beyond the foothills of the Columbia valley. Very slightly east of north lay clearly in sight the white swells of the great Columbia snowfield. At the northwest corner rose Mt. Columbia, at the southwest Mt. Bryce. In rotation, we traced, by their exalted stature and relative positions, the respective masses of Mts. Saskatche-

wan, Lyell and Forbes. Still further to the south, three peaks rising in close proximity to each other were assumed to be Mts. Freshfield, Pilkington and Walker. It has been attempted to apply the Selkirks triangulation to ascertain altitudes for Mts. Columbia, Bryce, Lyell and Forbes, using, in conjunction with Hermit mountain, a station eighteen miles to the southeast. By the computation, they are distant and of altitude as follows:—Mt. Columbia, 58 miles, 12,740 feet; Mt. Bryce, 51 miles, 11,686 feet; Mt. Lyell, 47 miles, 11,463 feet; Mt. Forbes, 44 miles, 12,075 feet. These results are by no means conclusive.*

On the way down, we saw a fine flock of ptarmigan (*Lagopus leucurus*). This species of grouse is very plentiful in the Selkirks and may be seen on nearly all the higher summits, where there is vegetation among the rocks. The birds are very handsomely plumaged: brown and white during the summer and pure white in the late fall and winter. We also saw, on the Tupper névé, a flock composed of hundreds of small birds. They were about the size of snow birds and probably were some such species, but not yet decked in their more brilliant winter plumage. They seemed to be having a fine feed upon myriads of insects with which the surface of the snow-field was covered.

The section of the Selkirks just described as tributary to the amphitheatre above Rogers pass, and already referred to in the account of last season's survey, is remarkable on account of its glaciated troughs and markings and the tangle of moraines on all sides. It is a wonderfully attractive spot, owing to the desolation and primitive nature of the surroundings, and the lesson it conveys in the structure of worlds. The time and energy expended in visiting it would be found well repaid. It is to be hoped that, before long, a trail will be constructed from the site of the old Rogers Pass station to the amphitheatre and a cabin built to accommodate visitors during their stay, for it is too far to make the trip from Glacier House and return in

* They are the means of computations from four different stations.

Marion Lake on Mount Arrott.

one day with any degree of comfort or pleasure. Such a trail can be readily constructed and plenty of stones and glacial mud can be found, wherewith to build a cabin.*

In his charming book, 'Among the Selkirk Glaciers,' the Rev. W. S. Green, of the English Alpine Club, has described his ascent of Mt. Bonney and the grand and far-reaching view southward from its summit in such glowing terms that I had made up my mind our first move in that direction should be an ascent of this peak. It was not proposed, however, to make the attack from the same direction, but to proceed viâ Mt. Abbott and the southern slopes of Mt. Swanzy. The advantage of such a route lay in the fact that the railway company has constructed an excellent trail for ponies, on easy gradients, leading directly to a grassy plateau below the eastern rock escarpment of the Abbott ridge. The path, on the way up, touches 'Marion lake,' a mountain lakelet, nestling in a rocky basin on the northern flank of Mt. Abbott. It contains about five acres, surface area. From the southern margin, a most exquisite picture meets the eye: across the placid surface, springing from their own reflections, rise a fringe of tall and graceful spruce trees of varied hues of dark green, set off at their base by a line of emerald marsh grass. Between the openings, the snow-fields, glaciers and rock peaks of the Hermit range make a most effective background. A branch trail leads to 'Observation Point,' from whence, a glorious view down the Illecillewaet valley is obtained of both the railway and the river; also of the two fine peaks at the head of Cougar creek, previously referred to as having been occupied for photographic stations by the survey.

On the 12th August, an outfit was taken to the plateau above mentioned and a camp pitched. On the way up, we met Sir Henry A. Blake, the Governor of Hong Kong, and his daughter. They seemed interested in the outfit of pack-ponies, seen in such a spot and on so narrow a path, and stopped to make inquiries

* Since the above was written, a trail has been made and a cabin built.

concerning the nature of the work and other matters connected with the region. It may be said that this same outfit of pack-ponies crossing the lawn at Glacier House, either back or forth to the supply camp at the Asulkan, nearly every day for a month, created much interest and amusement among the visitors. It was almost a customary procedure to stop the pack-train in order to photograph it. The pack-master states that he and the train were photographed twenty-eight times during the summer. In each case he was promised a print of the photo taken, but only one eventually came to hand.

To reach Mt. Bonney by the route selected meant a long and arduous day and there would be no time for mistakes: so, to minimize chances in this respect, it had been arranged to take one of the Swiss guides with us. Just about dark, Charles L. Clarke came up and preparations were made for an early start. We rose at 2.30 a.m. and reached the crest of the Abbott ridge at 4.10 a.m. It was daylight, but the world was scarce awake, and we did not stop long to admire scenery. The Abbott ridge was then followed, the Afton snow-field crossed and the west slopes of Mt. Afton and the Rampart traversed till the snow above the Lily glacier was reached. We soon stood upon the Lily col and gazed into and across the valley of Geikie creek. On the right rose the precipices of Mt. Swanzy, on the left those of the Dome. We now followed the south slopes of Mt. Swanzy. These soon became steep and we were forced to keep continually ascending. The bergschrund was crossed without great difficulty. Soon after, my dog, a black setter, who had a reputation as a mountain climber and had climbed every peak in the Selkirks ascended by the survey party, except three, slipped on an ice slope and fell three hundred feet in a series of catherine wheels. As he vanished over a ledge, we gave him up for dead, but he appeared a short distance below wagging his tail and apparently little the worse for his fall. We now had to be careful, but still did not use the rope. A tongue of ice projected

Illecillewaet Valley from Observation Point.

into a chasm. The guide managed to get a hand-hold and drew himself up. As he did so, the rock he had used broke away. He then lowered the rope and bodily hauled up the rest of the party. Still forced upward, we crept over a snow-ledge and found ourselves on the summit of Mt. Swanzy (9,562 feet). It was now simple. Following the snow ridge joining Mt. Swanzy to Mt. Bonney, the way lay down and up to the summit of a sharp-pointed peak immediately east of the latter. Here, the question of mountaineering or topography again became an issue. A dense body of smoke was rolling up Fish creek, the sun would soon be over the point it was desired to photograph and there were indications of a brewing storm. It was now after 11 a.m. and we had been steadily on the go since 3.30. The summit of Mt. Bonney was still an hour distant, but the path lay up a snow-slope easy of accomplishment. It was, however, photograph now or not at all for that day, so topography won and, to our intense regret, Bonney lost. The views, though by no means first-class, have proved of very great value and it would have been difficult to map without them.

In the Fish creek valley, an isolated patch of bush, close at hand, was on fire. It is difficult to imagine how it could have been ignited except by some natural cause. Later, it was examined and did not seem a likely spot for a prospector or any other mortal to have been.

The peak occupied has been named 'Clarke's Peak,' as our guide was the first Swiss mountaineer to set foot upon it. The altitude is 9,954 feet, and that of Mt. Bonney 10,200; only 246 feet higher and still the second ascent of Mt. Bonney remains unaccomplished.* We left the peak at 2 p.m. and reached the camp at 7 p.m., just at dark. On the way home, we picked up the old dog, who had been unable to ascend and had patiently awaited our return. The guide returned to Glacier the same night.

* Second ascent made by Henrietta L. Tuzo, of Warlingham, England, in September of 1904.

August 14th, the heavy body of smoke referred to had rolled up and work was out of the question. August 15th, it rained off and on all day, but cleared towards evening, so preparations were made to ascend to the summit of Pollux the next day. We arrived at the crest of Abbott ridge at 5 a.m. From here, the route was the same as that to Mt. Bonney as far as the Lily col. Then keeping straight on, to the left, an ascent was made without difficulty to Sapphire col, lying between Castor and the Dome. Exactly at the crest of the col is a pool of water, clear as crystal, lying in a hollow of the snow. From the summit of Castor it shows in the sunlight a deep transparent blue and sparkles like a sapphire on a bed of soft white velvet. It is probable that this originated the name of the col. I think, it was so called by Professor Chas. E. Fay, now President of the American Alpine Club.

The summit of Castor is 9,108 feet in altitude. Pollux can be reached by following the arête between the two. At the latter summit, a camera and transit station was established and a round of views taken; also, transit readings upon previously established stations and other points. The altitude of Pollux is 9,176 feet. We reached the summit at 10 a.m. East and south, good serviceable views were obtained of the Illecillewaet and Asulkan névés, and of the northern faces of Mts. Fox, Selwyn, Dawson and Donkin. Beyond the Dawson range, a number of snow-caps showed ghostly white against a black and lowering sky. Most striking amongst these was the symmetrical shape of Mt. Purity. To the southwest and west, black clouds and masses of rolling vapour portended another storm and rendered the views indistinct and indefinite. Notwithstanding, we could trace the valleys of Mitre and Van Horne creeks and see dimly the snow-fields and huge glaciers forming the sources of the latter. The densely timbered Fish creek valley was lost in gloom. We returned to main camp at Rogers pass the same evening. The camp below Abbott ridge had already been brought in.

During the absence of the survey party, the packers had been accumulating supplies at the Asulkan camp. On the afternoon of the 18th, with four ponies, we started for that point to carry the work beyond the pass. The night was spent at the supply camp. Ponies could go no further, so next morning, each man packed his blankets and as much provisions as he could carry in his rucksack, bundles were made of the light alpine tents and, with full loads, the party started in single file over the Asulkan glacier and névé.

Patches of red snow of the Arctic regions are frequently seen on the Asulkan névé, and in many other places in the Selkirks where lie bodies of snow. In the 'Minute Book' at Glacier House, under the year 1902 is the following query:—'One thing I have noticed among these mountains is the red snow found in many places. Sometimes it is quite a brilliant scarlet colour. Can anyone give an explanation of this? The Swiss guide did not know, but said someone had told him it was mosquitoes.' Below this is written:—'The red snow is due to the presence of a tiny plant well known to botanists. Some specimens of red snow can be seen in the Academy of Natural Sciences, Philadelphia, brought by Peary from one of his Arctic explorations.' Professor John Macoun, Dominion Botanist, says concerning it:—'It is not of rare occurrence high up in the mountains, but is seldom noticed, as it is most often green and only discolours snow. It is a unicellular plant, an alga, related to the sea-weeds, and belongs to the lowest form of plant life. The scientific name is *Protococcus nivalis* (red snow). It grows on the surface of the snow and is only a state of the species named *Protococcus viridus*, because it is green. The plant is most frequently seen as *green* slime on trees, old boards, etc.'

Arrived at the crest of the pass, the view beyond was disclosed in all its glory. To the left rises Mt. Fox, the summit a blunted cone, partly snow-covered. Upon the side directly opposite, two hanging glaciers send their fragments to the main

ice river below. Over the outline of Mt. Fox may be seen the long drawn-out mass of Mt. Dawson with jagged rock edges outcropping from its perpetual snows only to be buried in clouds that almost continuously wrap it around. Still to the left, the white crest of Mt. Selwyn is just seen. To the right of Dawson, alone, stands the sharp cone of Mt. Donkin, a huge natural observatory. Between, is the snow-mantled Donkin pass, and at their base, the Donkin and Dawson glaciers flow together. The latter is remarkable for the long symmetrical lines of the two lateral moraines, which, like well-built levees, define its flow. The scene is one of wild and rugged grandeur, the almost entire absence of timber depriving the landscape of the softer touches found at the lower altitudes of Glacier House surroundings.

Immediately below the Asulkan pass flows the Geikie glacier —an ice river forming the main outlet of the Illecillewaet névé on the south. The descent to it is 2,800 feet, the upper portion over shale, snow and grassy slopes, the lower down steep cliffs with projecting, sharp rock-edges, that cut like a knife. The grass-land abounds in many varieties of alpine flora and during the summer months is gay with bloom. As indicated by the name Asulkan,* the wild goat much frequents the slopes on the south side of the pass and are frequently seen. Two were shot by the guide, Clarke, within a few hundred yards of the pass, during our stay.

The Geikie glacier affords a good specimen of an ice river, and shows markedly the points of similarity between its flow and that of an ordinary river moving over a steep bed. Here, the lines of crevasses, curving slightly outwards, indicate the more rapid movement of the centre of the stream; while the much broken ice extending, in several places, across its otherwise even flow, corresponds to broken rapids in the stream of water.

* Indian for wild goat.

Ice Grotto, Antisana Glacier.

We descended quickly, using our ice-axes to good advantage at the steeper parts. Swinging down these into a couloir on the left, the descent became easy and was much assisted by five glissades over deposits of snow filling up the bed of a tributary stream. The glacier is a little over two miles long and about 1,500 feet wide. It is easily crossed, as the ice at this part is generally uncovered by snow and the crevasses can readily be avoided. A climb over the south lateral moraine, and up the right moraine of the Dawson glacier, brought us, at an elevation of 800 feet above the ice, to a little grassy, boulder-strewn flat, beyond which vegetation ceased to exist.

Here, a tent was pitched and preparations made for a lengthy sojourn. The camp was not withdrawn until September 17th. The same day, a return was made to the Asulkan camp and a second trip with packs to the Dawson camp, arriving there at dark. During the day, we had ascended 7,350 feet and descended 7,875, or altogether, up and down, 15,225 feet, and half the time had carried heavy packs.

On the return trip, when crossing the Asulkan névé, a dark object was noticed some distance in front. While looking, it became a head and shoulders and, finally, a man emerged, apparently, from the surface of the snow. On reaching him, he was found to be a tourist, who had travelled up this far by himself to photograph and had suddenly disappeared into a crevasse. Lucky for him, a staff he held had caught crossways on the edge of the ice and stopped his fall, which otherwise would have been serious. He appeared somewhat frightened. The same morning, the guide, Edouard Feuz, who was leading with five on the rope, had also disappeared into a crevasse, as far as the rope would allow, owing to a snow-bridge he had attempted giving way. On chaffing Edouard about the mishap, he replied laconically, with a characteristic shrug of his shoulders, 'It ees not de first time.'

No matter how silly you may feel, it is not safe to travel on any glacier or snow-field without being roped. In such cases, with three or more on a rope, it is a pretty sure safeguard against fatalities. This is good sound theory, but I must confess that we crossed the Asulkan névé and glacier many times, even when swathed in a dense bank of clouds, and did not use a rope once. On one occasion, an assistant and one of the packers, a very respectful Englishman, were crossing to the Asulkan camp for supplies. Suddenly, the assistant vanished through the snow, which fortunately only buried him to the neck. 'Hello!' he exclaimed, 'I'm in a crevasse.' 'Indeed, sir! and it *was* clever of you to find it,' replied the man with all earnestness.

The camp by the Dawson moraine is an ideal spot. Here, a cabin might advantageously be built for the accommodation of visitors, as a centre from which the surrounding peaks could be readily reached. A trail down the south slopes of the Asulkan pass would greatly facilitate access to it. The scenery is wild and rugged in the extreme. Along the lateral moraines of the Dawson glacier, numerous flocks of wild goat have worn well marked paths and several flocks were seen along their crests during our stay. The intense loneliness of the scene is relieved by the shrill note of the whistler, resounding from crag to crag, and the sharp squeak of the tiny pika or little chief hare (*Lagomys princeps*). The latter sat around on the boulders in numbers and became quite friendly. Their little paths led to and fro among the rocks, and at intervals along them could be seen bundles of flowers and grass laid out to dry for winter food. My son, a boy of twelve, who was with the party, shot several, using a '22 rifle. These were skinned by Mrs. Charles Schäffer and subsequently presented to the Academy of Natural Sciences at Philadelphia. Dr. and Mrs. Schäffer have for years been regular guests at Glacier House and have shown a deep interest in this section of the Canadian mountains, from natural his-

tory, botanical and picturesque points of view. A number of Mrs. Schäffer's natural history and flower studies are herein reproduced.

Wood and water are here plentiful and convenient, and from such headquarters the following high peaks of the Selkirks may conveniently be climbed, viz.:—Mts. Dawson, Deville,* Fox, Donkin and Macoun. In addition, many interesting points of lower altitude can be reached and the Geikie, Dawson, Donkin, Swanzy, and other glaciers in the vicinity visited. There are also, some fine falls to be seen in the valley of Geikie creek, not far below the foot of the glacier.

On the 20th, it was attempted to occupy a high point on the east side of the Asulkan pass, immediately across the Geikie glacier, to the north of the camp. We had nearly reached it, when some recëntrant rock-faces interposed. A rope had not been brought and the climbing was slow and dangerous. The ice-axes, in addition to the survey instruments, were found to be in the way and we were using our putties to hand the things up, so as to leave the arms of the climbers free. At this juncture, my old dog, who was always with the party, began to get excited, sprang to a rock, slipped off and fell 700 feet to a ledge below. He was quite dead when he stopped rolling. The loss of this old friend, who had been a companion in camp for many years and had such a first class record as a mountain climber, added to the startling realization of the result of a slip or false step on our own parts, quite took the heart out of us and we did not feel like further progress upward; so, climbing down to the nearest prominent ledge of sufficient space, the work of photographing was done from it. The station is named 'Geikie North' and is at an altitude of 8,014 feet. The glacier is 3,000 feet below. The station commands a fine view to the south and of the Geikie creek valley to the west. The work completed, we climbed down to where the old dog lay on a ledge

* Re named 'Selwyn.'

of shale, and, covering him round with moss, built a cairn over him. A long, flat slab of stone was raised on end in the centre and on it, as well as could be done with an ice-axe, was inscribed the word 'Fritz.' There was no time for more. The sun was setting and we had still over two thousand feet of a stiff rock climb.

It had been decided next to make the ascent of Mt. Dawson, until recently supposed to be the highest peak of the Selkirks. The guide, Edouard Feuz, who had made the ascent twice before, arrived at our camp the previous evening with his nose bound up with plaster, the result of his descent into the crevasse. I employed a guide on this occasion, as I did not consider my education in snow and ice work to be as yet sufficiently complete to assume the responsibility of the lives of my companions.

At 5.10 a.m. on the 22nd, we started, following the right Dawson moraine for a mile. At the end of this distance the moraine vanishes in overlying slopes of snow. The end wall of the Dawson amphitheatre now comes in view. Half way to it, the snow-slopes above the glacier, which are easily traversed, expand upwards and furnish a ready means of reaching the summit of Mt. Fox. The rock wall referred to lies between Mts. Dawson and Fox and is 800 feet high. Except in the case of a novice, it does not require a rope. Arrived at the top, you stand on the edge of 'Glacier Circle' lying between Mts. Macoun, Fox, Selwyn and Topham. It is reached from the Beaver valley by a comparatively narrow opening in the great eastern escarpment of the Selkirk range between Mts. Macoun and Topham. The mountain on the north side of this rock portal was named 'Macoun' by the Rev. W. S. Green in 1888; the one on the south side, I have called 'Topham,' owing to the fact that Harold W. Topham of the English Alpine Club was the first on record to visit it and camp within the Circle in 1890.

THE DAWSON AMPHITHEATRE

From the crest of the amphitheatre, a rock and snow arête leads southward to sky-line, terminating in a shale-topped mound, midway between Mts. Dawson and Selwyn. Before reaching it, we turned to the right and crossing a snow col arrived at the bergschrund. Assuming the rope, the schrund was passed with little difficulty. In a few minutes we stood upon the east corner of Häsler peak.

Mt. Dawson was first ascended by Professor C. E. Fay and Professor H. C. Parker of the Appalachian Mountain Club in 1899. On that occasion they were accompanied by the Swiss guides, Häsler and Feuz. In their honour, these gentlemen named the two highest crests of Mt. Dawson respectively, Häsler and Feuz peaks. The highest point of the former is 11,113 feet and of the latter 10,982 feet. They are nearly three-eighths of a mile (1,875 feet) apart. From the east or west, in the line of the ridge, each looks a sharp peak, but from the north or south they are of elongated structure and present square, ragged, rock-ridges topped by snow and separated by a snow col.

To reach the highest part of Häsler peak, it was necessary to cross the heads of a number of snow-slides, where a fall would carry you almost sheer, more than 3,000 feet, to the Bishops' glacier below. Great caution is here required. We arrived at 10.20 a.m. The day was perfect and exceptional. Edouard said it was the first view he had obtained, as both times before the landscape had been lost in clouds. To the south and west a glorious panorama was obtained. It is difficult to describe a scene of such immensity. The horizon plane cut clear above all other heights in the field. Snow peaks rose in every direction; but most prominent and attractive was the isolated and graceful form of Mt. Purity, some four miles to the southwest, rising a pure white peak from surrounding fields of snow. Everywhere, confluent glaciers sent their broken

masses to the ice rivers below. Jagged rock walls, too steep to sustain a weight of snow, broke the monotony of white by their black outcrops. Peaks, glaciers, snow-fields, ridges and valleys reached to the furthermost distance, which was lost in a roll of billowy clouds. It was chaos, and would have taken more time than we had at our disposal to reduce to order. So we worked quickly, for it was cold at that high altitude.

The great wonder of it all is the enormous quantity of snow and ice that yet lies stored in this vast natural reservoir, and the immense quantity of material carried away by means of erosion. If you sit beside the broad, swiftly-flowing waters of the Columbia river on a still day, you become conscious of a low hissing sound, as of sand poured from a sieve. This comes directly from the water and is due to the quantity of coarse sand and minute particles of rock and mica, carried in suspension by the current, that brushes against the bank. But a short study of the facts before us was necessary to give ample evidence of the cause producing this effect. Every ice river sends forth a turbulent mud-coloured torrent, rolling, crumbling and grinding the rock fragments and other detritus fed to it by its glacier. Every gorge and crack sends a contribution to the main torrent and the grinding and crushing process goes on through different stages, until the broad, evenly-flowing river carries only the minute particles seen in it hundreds of miles from its source. Not only did we gaze upon a vast natural reservoir for moisture arising from the wide expanse of the sun-scorched Pacific ocean, but also upon a huge natural crushing machine, preparing the material to produce fertile alluvial flats adjoining and tributary to their respective seaboards.

In a glass flask in a cairn previously erected were the names of Professors Fay and Parker, together with those of the guides Hasler and Feuz and the dates of the first ascent of the peak.

Soon after 2 p.m. we started downwards, arriving at camp without mishap at 5.15 p.m. Immediately northwest of the

The Twisted Rock, Dawson Amphitheatre.

end wall of the Dawson amphitheatre is a very peculiar rock exposure. It is the end of a spur from Mt. Fox and is really a part of the arête joining it to Mts. Dawson and Selwyn. The interior convulsion of the earth that upheaved this rock has caused the sub-strata of which it is composed to twist in an almost complete circle. At the top of the peak, for it has the appearance of a peak seen from below, the strata stand nearly vertical. They then descend, describing a pear-shaped synclinal curve, and rise upward until they lie beside the original folds. It has been named the 'Twisted Rock.' The height is a little over 1,000 feet.

To reach the summit of Mt. Selwyn,* the route for the most part, is the same as to Mt. Dawson, but, instead of turning to the right, you keep on to the crest of the shale-topped elevation midway between the two mountains. Thence, a descent across a short, sharp snow arête, where the rope should be employed, leads to the foot of the peak of Selwyn at its southwestern base. A climb up the southern slopes will then carry you with little difficulty to the summit. The morning succeeding the ascent of Dawson, we again started at 5.15 a.m. with the object in view of ascending Mt. Selwyn. On reaching the crest of the amphitheatre wall, the peak was seen to be wrapt in clouds and a cold sharp wind was blowing. The day looked threatening and we had no energy to waste, so it was decided to turn to the right and make the ascent of the lower peak, Mt. Fox. The east face of the arête was now followed for some distance, then crossed and a traverse made along the west face to the body of snow lying on the southwest flank of the mountain. This was crossed and an easy ascent over rock boulders made to the summit, which was reached shortly after 10 a.m. Although the summit was clear, most of the surrounding higher peaks were buried in clouds. A strong wind was blowing and

* Formerly Mt. Denali.

it was very cold. On the east corner of the chisel-shaped top stood the cairn erected by Topham in 1890. A round of views were taken, but owing to the high and bitterly cold wind, it was found impossible to obtain transit readings. Evidently the ascent must be made again; so we returned to the Dawson camp.

One of the packers, having found the work too arduous, had left the party. It was necessary to replace him, so all hands returned to main camp at Rogers Pass, arriving there at 11.30 a.m. The guide returned to Glacier. I then went down to Revelstoke by train and procured a new man.

August 26th, assistance was given to Mr. George Vaux, Jr., of Bryn Mawr, Pennsylvania, who was making some measurements of the Illecillewaet glacier with the object in view of ascertaining its relative rate of movement. Messrs. George and William S. Vaux, Jr., have for some years been conducting experiments in connection with the Illecillewaet and Asulkan glaciers in the Selkirks and the Victoria glacier in the Rockies. The results, set forth in several well written monographs, illustrated by their own photographs, have proved of much interest and have provided some useful additional information in this branch of science. Their investigations are referred to at greater length in Part IV., under 'Mountaineering.' On the present occasion a transit-theodolite was set at each end of a standard base, established previously on the right lateral moraine, and readings taken upon meral plates anchored at intervals across the surface of the ice in a direction at right angles to the flow of the glacier. The plates were first set in 1899, at which time angular readings were taken upon them from both ends of the base, to fix their position before starting. Eight plates were originally set out in line, of which number, six were now located and their change in position duly ascertained. That it was considerable was evident, for at the north end of the base a large boulder, deposited on the crest of the

The Dawson Range from Summit of the Ascekan Pass.

moraine, now intervened and considerable difficulty was experienced in raising the transit sufficiently to overlook it. This had certainly not been in the line of sight when the plates were first set out.

On the 27th, we returned to the Dawson camp. Imagine our surprise, on reaching the Asulkan supply tent to find it thrown down, torn in strips and boxes of provisions broken open and scattered in all directions. On the way up, the tracks of a huge bear had been noticed along the path worn by our ponies and investigation showed the same tracks all around the tent. My pack-master, a man of method and a careful, tidy fellow, went sadly through the remains to ascertain the damage. Two hams, a side of bacon, a tub of butter and sundry pails of jam had been cleaned out, while several boxes of bread, to keep up a supply of which was part of the cook's duty at main camp during our absences, were broken open and the loaves bundled promiscuously down the hillside. He had even attempted to swallow a camera and had left his teeth-marks in the leather case. An extra box of photo-plates had also been sampled. The bear hung around for some days and was seen by the packers on the trail lower down, at which time they were within fifty feet of him, but without a rifle. Then hunters began to come up, and finding the locality too hot, he left. Bears were very plentiful in the vicinity and several times during the summer were shot at from the railway track close to Glacier House. We had three visitors of this sort at main camp at Rogers pass. As a rule, however, they bore charmed lives, or else the local sportsmen were very bad shots.

There was now nothing to be done except leave the head packer, George, to repair the damage as best he might and sleep there that night, keeping up a good fire; so we pushed across the pass. On the way down, the new man, the Englishman before referred to, slipped and cut his hand badly on a sharp projecting edge of rock.

The Dawson tent was approached in fear and trembling, wondering whether it also had been raided by a bear. All, however, was found as it had been left.

We were now in for a spell of bad weather. It had struck us at the head of the pass and followed us down in the shape of clouds, rain and snow. It continued all the next day, and the most comfortable spot was under the blankets.

On the 29th, another attempt was made to obtain suitable views from Mt. Fox. About half way up, it clouded over and, when reached, the summit was in the clouds. It was freezingly cold and white hoar-frost settled in bunches and sprays on the rocks and other exposed objects. We remained a couple of hours, but eventually had to return without results. The packers had been sent to the Asulkan camp for provisions. When they reached the steep cliffs on the return journey, the one who had cut his hand seemed to succumb to an overwhelming fear. He put down his pack and simply ran back to the railway. I never saw him again.

August 30th, it rained and snowed all day. On the 31st, it was still raining, but not heavily. Whisps of cloud and white fog enshrouded us at intervals all day. We were tired of inaction, so making up light packs of some provisions and a tent, decided to explore the Donkin pass. The newly fallen snow rendered caution very necessary, but we roped and, keeping well to the right and following the main drainage line of the glacier, arrived, with little difficulty, at the end well of the pass. Here, across a schrund, rose a perpendicular face of ice, about 100 feet high. It did not look inviting, so we turned to the left and ascended the slope of the berg on that side of the pass. Ice-flutes provided work for the ice axes and it was necessary to ascend to a considerable height above the crest of the pass and then descend to it. It is a nasty little bit with packs and caused me much anxiety on behalf of the packers going to and fro while we camped beyond the pass. The tent and provisions were left at the summit.

The South Side of the Anuikan Pass from Mount Fox.

September 1st, clouds and rain. No peaks visible. Explored to the foot of the Geikie glacier and about a mile down the creek. At this distance, several fine waterfalls descend in white cascades from the Swanzy glacier, at least 2,000 feet to the valley below. Saw a bear crossing a snow-slope on the south side of the valley. He ran away as hard as he could. Returned to camp up the snout of the glacier.

September 2nd was a beautiful day. We again ascended Mt. Fox and were well rewarded. The temperature was that of a summer day and the sky cloudless. We reached the summit at 10 a.m. The altitude of Mt. Fox is 10,576 feet. It furnishes an excellent topographic station and, northward, a fine view of the Illecillewaet névé and its southern outlet, Geikie glacier. At the further end of the névé rises Mt. Sir Donald, the most prominent of all prominent peaks in sight. Below, to the west, you look down upon the Asulkan pass, its south slopes appearing almost perpendicular from this point of vantage. Then, the Swanzy and Clarke glaciers and the great snow-slopes that cover the entire south and west sides of Mt. Bonney, laid out as on a map, and showing in much detail the numerous cascades and torrents discharging their flow. Immediately to the east below lay Glacier Circle, and a glimpse could be caught of park lands dotted with spruce trees and sparkling green lakelets lying in the hollows. To the south, between Mts. Topham and Selwyn, the beautiful Deville glacier, fed by the white snow-swells of the névé above it, poured in fan-shaped terraces into the Circle. In rotation round the basin, the Fox glacier and the glaciers overflowing from the Illecillewaet névé sent their several ice-falls, separated only by ragged rock ridges descending sharply downwards. A few fleecy clouds overhead were reflected in the green waters of the ponds and the spruce trees cut black shadows on the grass land. It looked an Arcadia, where might be seen flocks of mountain goats lazily browsing in perfect security from the inroads of the hunter. On either side of the portal

rose Mts. Macoun and Topham, grim guardians of the sunlit peace within. The scene gave little inkling of its wilder, more turbulent and more frequent moods, when clouds of mist wrap it in a damp shroud, when avalanches roar day and night and all is grim and black and wet.

Through the opening, a peep was caught of the Beaver river winding in the dark blue depths of its valley: and beyond, of the plateaus of Bald mountain and the brown steeps of the Dog Tooth range, rising on the east side of the Spillimacheen river.

From Mt. Fox a shoulder extends northward. On it, immediately above the Dawson camp, are a group of fantastic shapes. They resemble a number of old beldames leaning from the parapet of a rock tower and scattering vituperation broadcast over the earth. The feature has been named 'The Witch Tower.'

The next day we successfully occupied Mt. Selwyn,* leaving camp at 5 a.m. and arriving at the summit shortly before 10 a.m. The altitude of its highest point is 11,013 feet. Here, still stood the cairn erected by Topham and Forster in 1890. Southward, a fine view is presented of the full length of the Deville névé and of the snow peaks along its western side. Eastward, the summit commands the country beyond the Beaver river, but in this direction the view was somewhat dimmed by smoke.

September 4th, the clouds were down low, accompanied by drizzle during the morning, turning to snow and rain later in the day. The survey instruments were taken to the summit of the Donkin pass and cached; then, packing up the tent and provisions previously taken up, a descent was made of the south slopes in search of a camp ground. The Donkin pass stands at an altitude of 8,556 feet. The descent on the south side to the ice of the Bishops' glacier is 1,600 feet down easy slopes, the upper part shale and the lower, grassy steps. We crossed the torrent

* Formerly Mt. Deville.

at the foot of the glacier and, traversing the side of the opposite ridge, reached an immense rock slide, which had attracted our attention from the summit of the pass and seemed to lie across the direct path to Mt. Purity. On the opposite side of the slide was a timbered crest, where it was hoped a camp ground would be found. It was not, however, until the foot of the slide was nearly reached that water could be had. Here, in a clump of spruce, a little pool of clear fresh water was found. A platform was levelled between two spreading spruce trees within a few feet of the pool. It was a snug, sheltered spot with abundance of fuel and soft boughs for beds, so the tent was quickly pitched, the provisions hung to the ridge pole—a wise precaution, for the mice are very inquisitive—and a return made to the Dawson camp. The Donkin pass was enveloped in clouds, but, fortunately, we hit the right path.

From the 5th to the 8th of September bad weather prevailed and there was no chance of continuing the survey. A return was made to Rogers Pass camp, crossing the Asulkan névé while buried in a thick bank of clouds. As usual, we had no rope. Five yards in every direction was a blank white wall. It was a case of prod with the ice-axe, then a step, another prod, another step and so on. Sometimes the staff would sink to the head in vacancy. If the crevasse thus discovered was too wide to cross by a spring, it was prod, prod until it could be crossed, or the end had been passed. It was an anxious time. Now and again, a break in the fog would disclose great ice cracks on either hand and so give a clue to the direction. Twice, the whistle of an engine at Rogers Pass station served a similar purpose. About an hour and a half of this sort of work and suddenly the fog seemed to rise and disperse, and the familiar landscape burst upon our view. In reality, we had walked below the cloud bank.

The weather having cleared and, apparently, settled by the 8th, on that morning, a return was made to the Dawson camp. The party was accompanied by the little Swiss guide, Friedrich

Michel, for I was anxious to lose no time through mistakes of judgment should the fine weather continue for a few days. On reaching the crest of the Asulkan pass, a joyous Swiss hunting-call greeted us. Here was Clarke, with a comrade, busily engaged in skinning two mountain goats just shot on the south slopes of the pass. A chorus of calls now passed between the guides, and the surrounding spurs and ridges picked up and multiplied them until the valleys rang with the cheery sounds.

Mr. H. W. Gleason, of Boston, who has done some excellent photographic work in the Canadian Rockies, accompanied us to the crest of the pass and obtained a beautiful view of Mts. Fox, Dawson and Donkin from a short distance below the summit. Through the kindness of Mr. Gleason, this particular view, which seems—so far as can be done in photography—to have caught the spirit of the scene, is here reproduced. Mr. Gleason has also permitted the reproduction of several others of his beautiful views, which he has lately been using to illustrate his lectures on Canadian Rocky Mountain scenery in various cities of the United States.

The week ensuing embraced the finest weather and hardest work of the summer. In it, we made five climbs and packed the camp by the rock-slide back to the Dawson moraine on the sixth day.

On the 9th September, leaving our packs at the summit of the Donkin pass, the instruments previously cached there were picked up and an ascent made of Donkin peak. The cairn erected by Topham in 1890 still stands on the summit. We left camp at 7 a.m. and arrived at the highest point at 11 a.m. The walking over the Donkin névé was heavy, owing to newly fallen snow, and the climb, an easy one, can be made in less time under better conditions. The altitude is 9,694 feet. It is a central isolated peak and commands a glorious view on all sides. Across the Eisbops' glacier, rose the two highest peaks of

The Bishops' Range from summit of the Donkin Pass.

the Mitre* ridge. Seen from the summit of Mt. Donkin they resemble an episcopal mitre and, it is presumed suggested the name, which was conferred by Topham.

The range showed clear against a most effective background of fleecy clouds (see view). Across the valleys of the torrents draining, respectively, the Bishops' and Dirty† glaciers rose Mt. Purity, at the west end of a line of snow caps extending easterly beyond the Bishops' range. The sun shone white on their snowy sides and sparkled on the ice piled in every recess. Past Mt. Purity, we could see where the two streams, above referred to, joined Van Horne creek, and again where that stream joined Geikie creek. Between Van Horne and Fish creeks rose a mountain mass composed of two principal points of nearly equal altitude and presenting several beautiful glaciers. The northerly point, 9,445 feet, it is proposed to name 'Tomatin Peak' and the southerly, 9,501 feet, 'Findhorn,' while the entire mass is named Mt. McBean after a good old Scotch clan. Beyond, lay a confused array of snow covered peaks, snow-fields and glaciers, looming mistily above the deep blue haze of the Fish creek valley.

The work completed we descended to the camp by the rock-slide, known as 'Horne Camp.' We were astir at 2.30 a.m. on September 10th and had breakfast by firelight. Then, crossing the rock-slide and descending the timbered ridge forming the west end of the Bishops' range, probably 1,000 feet, through a tangle of underbrush and fallen timber, we reached and crossed the torrent flowing from Black glacier. This stream and the

* Owing to a duplicate name in the Rocky Mountains range, which has been confirmed by the Geographic Board, it is found necessary to change this one, and it is now suggested that 'The Bishops' Range' be substituted, naming the two highest peaks, respectively, 'Augustine' and 'Cyprian.'

† The latter so called by Baker and Topham on account of the quantity of glacial mud and detritus covering its surface. It is suggested that 'Black glacier' be substituted.

Mitre torrent unite not far below the rock-slide and then joined flow into Van Horne creek a little over half a mile above its junction with Geikie creek. Having crossed the stream, the path lay up an old terminal moraine to a point beside a glacier, marked down the previous day. The glacier was easily crossed and the climb continued upwards to a grassy plateau. The plateau terminated in a dip filled with snow lying between the lateral moraine of another glacier and the precipitous rock-face of the northerly shoulder extending from Mt. Purity. The dip carried us to the base of the steep snow slopes leading to the crest of the mountain. It was now slow work, kicking toe-holes in the hard snow, and it took 2½ hours to reach the summit, where we arrived at 9.30 a.m. We found here the cairn erected by Huber, Topham and Forster in 1890. The day was warm and summer-like, and work was performed very satisfactorily. Extending easterly from Mt. Purity, the line of snow-caps previously referred to reached a climax in a high peak cornering on the Deville névé. This peak was assumed to be the 'Sugar Loaf' of Huber, Topham and Forster, and it was decided to make the ascent, if possible, on the following day. Turning southward, the same range of snow-caps extends for some distance and furnishes the source of the Grand glaciers on the east. On the west, the circle of peaks constitutes the amphitheatre at the head of Battle creek, which stream, flowing at the base of a steep serrated rock range to the south, joins Fish creek at a considerable distance below. At the head of Battle creek, two attractive looking glaciers flow together. One from Mt. Purity and the other from the high corner peak referred to. It is proposed to name these glaciers, respectively, 'Odin' and 'Thor' as appropriate sources of 'Battle' creek. Southward, could be seen the more heavily timbered and lower ranges of the Kootenay country, the deep depressions of the Arrow and Kootenay lakes and the Fish creek valley, traced to its junction with the north arm

Origin and Type Glaciers, Mt. Wheeler and Granite Mt.

of the former lake by the dense blue haze enveloping the trough in which it flowed. The altitude of Mt. Purity is 10,457 feet.

On the 11th, we were off again at daylight, traversed the rock-slide and north face of the Bishops' ridge to a point on the Bishops' glacier at a considerable distance above the snout; then, following the southern edge of the glacier, we reached the summit, from which point slopes of snow descend easterly to the Deville glacier. Working round to the right, without losing elevation, we gained the Deville névé and came in sight of our peak. Some time was lost in attempting to ascend a shoulder extending northward into the névé. Arrived at the crest, it was found very dangerous and slow to proceed, owing to an ice-cap and snow-cornice; so a second attempt was made more to the west by turning into a deep bay and ascending to the height of snow between it and Battle creek, and then, by easy slopes of snow, to the summit of the mountain. Only one snow-arête, requiring caution and the rope was encountered. There was no sign of previous occupation, and it soon became apparent that it was not 'Sugar Loaf' and that the peak had not before been ascended. In altitude it is 11,023 feet, and has been named 'Mt. Wheeler.' It commands to the south a view of the Grand glaciers and part of the headwaters of Battle creek. To the east, it overlooks the Deville névé, the Dog Tooth range and the Spillimacheen mountains beyond the Beaver valley. Across the Dog Tooth range, could be recognized the peaks of Mt. Goodsir and, clearly defined, the sharp point of Chancellor peak. As the altitude of the latter has been ascertained with some degree of accuracy, I have computed the elevation from the Selkirk triangulation, in order to check the utility of the computation of Mts. Columbia, Lyell, Bryce and Forbes, all unknown quantities, from the same source. The altitude as established by the Canadian Topographical Survey is 10,780 feet and by computation from the Selkirk triangulation is 10,751 feet.

At the southeast corner of the Deville névé was seen a high peak, previously noted from Mts. Fox and Selwyn. It overhung the Beaver river valley and, on this account, it was decided to occupy it.

On the return journey, one of the party very nearly met with a disastrous accident. While descending the Bishops' glacier, he broke through the snow into a crevasse, at a place where it had already been crossed by two others, and, had not his axe caught lengthways on the ice edges, would probably have lost his life. Attracted by his cries for help, we returned and pulled him out. The crevasse was a very deep one.

On the 12th, a station was occupied on the edge of the higher westerly portion of the Bishops' range at an altitude of 9,289 feet. It proved an excellent topographic station. The little Swiss guide, who was used up by the strain of the continued climbing, was now permitted to return home and left us at noon that day. The next morning, we again started at daylight and, following the route of the 11th to the Deville névé, struck across it and ascended the peak overlooking the Beaver river. The summit was reached at 10.30 a.m. It is at an altitude of 9,901 feet. The position afforded a fine, detailed view of the river valley, both north and south, and in the latter direction showed plainly the snout of the glacier from which the stream takes its source and the watershed between the Beaver and Duncan rivers. Southward, a very fine view is obtained of Mts. Duncan, Beaver and Sugar Loaf and of the Grand glaciers, flowing beneath them in crystal confusion. The Grand glaciers spring from separate sources on either side of a great isolated central mass of rock and snow and then flow side by side, separated only by a well defined medial moraine. The central mass has been named 'Grand Mountain,' altitude 10,852 feet. The glaciers are exceptionally interesting, and the northern one very much broken and crevassed, showing wonderful séracs and ice-falls. The huge mounds and terraces of snow, softly undulated in

THE GRAND GLACIERS, MTS. SUGARLOAF, BEAVER AND DUNCAN.

light and shadow, surrounding the upper extremities of the ice are, in both cases, very beautiful. Eastward the plateau of Bald mountain lay spread out as on a map and it was easy to plan an expedition to them for the purpose of mapping the great eastern escarpment of the summit of the range. The station was named 'Beaver Overlook.'

Work was now completed as far as it could be reached from Horne camp. Less than half a mile below the camp, Mitre creek descends in a very picturesque waterfall, well worthy of a visit.

On the morning of the 14th, we packed up and, with heavy loads, made the return journey over the Donkin pass. Soon after leaving the rock-slide we encountered an old camp-ground where an abandoned tea-pail, frying-pan and several tins of preserved meat lying around proclaimed the previous home of some prospector or explorer. A more careful search disclosed, among other trifles, a package of Swiss edge-nails for climbing-boots and clearly identified the camp-ground as that of Messrs. Huber, Topham and Forster in 1890. We all obtained rolls and took with us one tin of 'Armour's Corned Beef.' It was eaten that night for supper and, although it had been lying beneath the snow and sun for twelve years, was in perfect condition and a pleasant change from our continued salt fare.

At the summit of the Donkin pass, a station was occupied for the purpose of ascertaining its altitude, and four views were taken. The altitude of the pass, as previously stated, is 8,356 feet.

The work from Horne camp was only closed in time. On the 15th, the clouds were down and it snowed and rained all day. The 16th and 17th were spent in an only partially successful attempt to obtain readings and views from a prominent point extending northward from Mt. Donkin, in order to cover the valley and bed of Geikie creek. We closed the work on the afternoon of the 17th and at once started over the pass, pushing

on the same night to the camp at Rogers pass. Thus ended the expedition into the interior. The system of supply camps worked well and might have been pushed forward indefinitely, only requiring more packers as the chain became longer. We were not once short of provisions, and had always plenty of luxuries in the shape of evaporated fruits, canned vegetables and good bread.

On the 19th, the camp at Rogers pass was visited by the Rev. James Outram, who had been exploring in the Rockies and had just succeeded in climbing Mts. Columbia, Bryce, Forbes, Lyell and others. He now agreed to join our party in a trip about to be made to the valley of the Incomappleux river (Fish creek), viâ Flat creek, a tributary to the Illecillewaet river.

On the 20th, by 8 a.m., five ponies and supplies were loaded on a car placed on the siding near camp. We waited patiently all day for a train to take us to Flat Creek, fourteen miles distant, and were eventually dumped near midnight in the wilderness by the road bed, not far from the mouth of the creek. It was too late to pitch tents, so, spreading one on the ground and one over, we rolled into our blankets between and slept peacefully without the least idea of where we were.

Having cached our surplus supplies in a tent pitched in the woods some distance from the railway, we pushed south over the trail leading to the summit of the Flat creek pass. The trail is a very fair one for ponies though somewhat wet. It had recently been travelled back and forth by parties working a mine of argentiferous galena on the south side of the pass. For some distance from the railway, it runs through a heavy growth of cedar, spruce, hemlock and fir, but as a greater altitude is attained, the timber becomes smaller until, at the summit of the pass, it consists only of mountain spruce and balsam. Camp was pitched the same evening at the watershed, near the ruins of an old shanty used when the trail was being made.

Three photographic and triangulation stations were occupied from this camp: One, on the west side of the divide at an altitude of 8,602 feet named 'Flat Creek Divide West'; and the other two immediately opposite, named respectively, 'Olivers Peak,' altitude 8,379 feet and 'Flat Creek Divide East,' altitude 8,318 feet. The two latter are close together. Mr. Outram accompanied us on both climbs. Olivers peak is so called after my son, a boy of twelve years, who made the climb, and was probably the first white man to set foot on the peak, certainly the first of that size. All the stations commanded excellent views, the two last particularly so, of the west slopes of Mt. Bonney and of the valley and windings of Fish creek looking southward.

We now packed up the camp and following the trail across the face of 'Jeopardy Slide'—a tract swept clear of timber at some bygone date by numerous avalanches and since grown thickly with brush, nettles and bracken—descended, by means of zig-zags in the path, to the edge of the wide gravel bed of Fish creek and camped in a piece of dense bush along its edge. This strip of timber is remarkable for the great girth of its cedars. Unfortunately, there was but the barest amount of grass scattered through them and the poor ponies had to browse on willow and other brush while there, a most unsatisfactory diet.

On the 25th September, accompanied by Mr. Outram, an examination was made up Fish creek to ascertain which of the two, Geikie or Van Horne creek, was the main source. The travelling soon became very bad. The current, sweeping alternately against either bank, necessitated the frequent climbing to a considerable height to avoid cut-banks and the precipitous sides of a 'box-canyon' encountered a mile or so from the start. It was found later that the water in the stream was not very deep and was seldom above the waist, so progress was facilitated by wading at the base of the cliffs and cut-banks. The narrow

valley is inclosed by very steep and imposing slopes, in many places presenting precipitous cliffs and outstretching spurs of fantastic shape. Waterfalls and cascades are of frequent occurrence, and drop from great heights in sheets of crystal spray. Belts of beautiful blue-green spruce border the stream and every now and again expand upward to a considerable height. The creek pours in a torrent over a bed of boulders and an advance is made by stepping from one to the other along its margin, a rather trying and slippery process, especially so when you are as often in the water as on dry land.

Progress was slow and it was 2.30 p.m. before we reached the point where Geikie and Van Horne creeks flow together, the latter augmented by the run-off of the Bishops' and Black glaciers. A rapid inspection showed that Geikie creek was the larger stream and flowed in a deeper and wider valley. It is consequently assumed to be the main source of Fish creek. The return journey was commenced at 3 p.m. and entailed a scramble above the box-canyon referred to and a number of crossings of the stream after the dark had set in.

From the 26th to the end of the month, snow, rain and cloudy weather prevented the photographic work being carried on, and nothing of consequence was done. It cleared during the morning of the 1st of October and a climb was made opposite the camp on Fish creek. The station is named 'Fish Creek East' and is at an altitude of 7,182 feet. It was an unsatisfactory occupation, as the recent snow covered the landscape with a white shroud and completely changed the aspect of the country, a distinctly detrimental feature in photo-topography. It was late when we finished and darkness overtook us by the way, making the descent difficult. Below, two thousand feet beneath, could be seen the camp fire burning brightly; and yet, what an immense distance that two thousand feet seemed to represent. It was a cloudy night, there was barely sufficient light to break the darkness and progress could only be

THE BIG GAME OF THE ROCKY AND SELKIRK MOUNTAINS.

made by feeling. In the very faint light, all slopes seemed precipitous. Twice, climbing down through cedar scrub, I felt my body swinging in space. The feeling was not pleasant. At length, after many checks and tumbles, we reached the shingle of the river-bed and came to the conclusion that climbing lacks much of its charm in the night time.

The following day was bright and beautiful. Accompanied by Mr. Outram we occupied a station named 'Fish Creek West,' altitude 6,915 feet, about a mile below camp on the west side of the stream. The snow lay heavier on the side of the valley facing east, and walking was difficult and arduous. On this account, it was impossible to ascend as high as desirable and still have sufficient time to do the work.

On the 3rd, camp was broken up and a return made to the railway. Mr. Outram undertook to walk down the creek to visit some friends at Cambourne, a mining village near its mouth. We had little information about the route and he experienced some difficulty, getting on a branch trail, which proved a blind one. Not wishing to retrace his steps, he continued at haphazard down the stream, being much retarded and fatigued by swamps, windfalls, scrub, etc. That night he slept under a tree without a blanket and with one small piece of chocolate for supper, for he had only taken a lunch from camp, hoping to reach his destination by nightfall. He arrived there at 2 p.m. the next day, with a ravenous appetite, but otherwise little the worse for wear and tear.

The night of the 3rd, we again camped by the railway. The next day, a station was occupied on the north side of the track, not far from 'Cougar Head.'* It was reached by an old trail up Cariboo creek and a long shoulder descending from the western corner of the Hermit range. The altitude is 7,776 feet. It is known as 'Cariboo Creek East' and overlooks the watershed

* Mt. Bagheera.

between Caribou creek and the north branch of the Illecillewaet river. On the 5th, we returned to main camp.

The day following, a camp was placed in the woods close to the snout of the Illecillewaet glacier to facilitate an early start the next morning. On the 7th, we ascended to the Illecillewaet névé, viâ the Sir Donald trail and Perley rock, and, crossing the névé, occupied a high point on its eastern edge, midway between Mt. Sir Donald and Mt. Macoun. It overlooks the névé on the west and south, the Beaver valley and country lying beyond on the east, and has been found a most useful station for mapping purposes. It lies at an altitude of 9,140 feet and is named 'Névé Station.'

Preparations were now made for the final trip of the season. It was intended, if possible, to reach Bald mountain, lying immediately along the Beaver valley on the east side, and facing Mt. Sir Donald and the Illecillewaet and Deville névés. It was desired to occupy stations along the crest, and so obtain data to map the western side of the Beaver valley. The side named consists of a bold rock-escarpment, broken by gorges and indentations, in which rest numerous glaciers, falling from the skyline of the Illecillewaet névé at an elevation considerably above that of Bald mountain. We now proposed to put into execution the programme planned at Beaver Overlook.

It was said that a trail, built by the British Columbia Government, extended from Bear Creek railway station, at the east entrance to Rogers pass, up the Beaver valley to the height of land and then down the Duncan river valley to the Kootenay country. Men had already been sent to examine the trail, which they reported feasible. They also reported a branch trail up Grizzly creek, a large tributary to Beaver river from the east. In consequence, on the 9th, we obtained a hand-car from the station agent at Rogers Pass and ran a camp outfit, survey instruments, etc., down to Bear Creek station and camped there for the night. While the ponies were being led down along the

track, with an assistant, I made a rapid examination of the trail leading up Beaver river and of the branch up Grizzly creek. The one up the Beaver valley was found in good order, but required some clearing out of windfall. It lies along the western slopes of the valley, crossing the old tote road, used at the time of railway construction but now grown almost out of recognition, and gradually descends to the level of the stream. At about a mile distant from the start, Bear creek is spanned by a single flattened log. At another half-mile, a rude bridge crosses the Beaver river. For probably two miles more, the trail follows a bench to Grizzly creek and is nearly all on the level. It now forks, the main path crossing Grizzly creek and continuing up the Beaver river valley, and the branch path leading up the north bank of the former stream. A rude sign board nailed to a tree stated in pencil that the path led to the 'Copperstain Mine.' It was decided to follow this path as the more likely one to rise to the level of Bald mountain. For a mile or so, it was badly obstructed by windfall and evidently had not been used for a long time. It then crossed the creek by a rough bridge, somewhat out of repair, and continued along the south side, rising rapidly. The trail was now much more clear but still obstructed at intervals by large fallen trunks of trees. At the distance of another mile, it turned up the west branch of Grizzly creek, still rising along the steep sides of the valley. It was followed only sufficiently far to see that it would eventually lead to the desired place. To clear out this trail, throughout the nine miles of its length to the open plateau of Bald mountain, would be no light undertaking; moreover, no feed for ponies had been found so far. Notwithstanding, it was decided to attempt the route and, the following day, an advance was begun, a party of three going ahead with axes to clear the trail. Where possible, a road was cut round the larger fallen trees and when this could not be done, they were cut through. As many of these trees were three feet in diameter,

it will be seen that it was a somewhat arduous undertaking without proper cross-cut saws.

During the afternoon, while superintending the clearing of the trail, an assistant came running up with the news that 'Pinto,' one of the pack horses, had tumbled down the mountain side and that the packers were unable to extricate him. On returning, I found him in a woeful plight. He was lying head down about fifty feet below the trail and had slid in under some logs. We worked at him until dark without success, for he would not make the slightest effort to help himself, and then left him until morning. It was now necessary to camp for the night in the dark, on a trail barely two feet wide cut from the mountain side, which extended steeply above and below us. We were surrounded by devil's club, which, though it could not be seen, was very frequently felt. A spot was found where the ponies could stand until morning, but, although they had worked hard all day, there was nothing for them to eat. The packs were strewn along the path, a fire lighted and supper prepared. By the help of our ice-axes, shelves were dug in the steep sides of the valley above us and on these we slept, rolled in our blankets, stakes having been driven in to prevent a restless sleeper from rolling down the mountain side. There was much merriment over the situation and, fortunately, the night was fine. It was pleasant, though somewhat eerie, to look up at the stars through the spreading branches of fir and cedar and to hear far below the roar of Grizzly creek pouring over its rocky bed.

In the morning, the old pack horse was shot. We had no time to spare in effecting his deliverance, for at any moment the weather might break finally for the season. So his load was distributed and we passed on.

Noon brought us to a hunter's shack where was a small patch of grass. We camped here to allow the ponies to feed and to find out how we were situated. Investigation showed that a

mile and a half further, the trail reached the summit of the pass from Grizzly creek to the head-waters of the south branch of the Spillimacheen river, also that there was open grass land in plenty and a charming variety of camp grounds.

On the 12th, an ascent was made to the crest of Bald mountain, immediately above the camp, and two stations occupied. They were named 'Grizzly Creek West No. 1' and 'No. 2' and are of altitude, respectively, 7,225 feet and 7,348 feet. Immediately opposite, beyond the deep violet haze of the Beaver valley, rose the bold ragged escarpment of the Selkirks summit. The whole eastern problem lay before us. The intricacies of numerous puzzles, presented by various ascents around Glacier House, were now unfolded. Snow-fields and glaciers assumed their respective values, and the problem of climbing the great mass of Sir Donald from the north or east was easily disposed of by the process known as *reductio ad absurdum*. The snow fields and glaciers lying below Avalanche, Eagle and Uto peaks, on their eastern slopes, were now, with their respective ice-falls, displayed in their true proportions. Passing Sir Donald, the ice-crest of the Illecillewaet névé was seen toppling over the rocky edge in numerous glacial outlets. Beyond the square mass of Mt. Macoun was the opening to Glacier Circle, guarded on the southern side by the equally massive structure of Mt. Topham. Within lay a circle of ice-falls:—the Deville glacier, the Fox glacier, the overflow from the Geikie glacier, and the overflow from the Illecillewaet névé.

On the 13th, two stations were occupied some miles southward along the crest of Bald mountain. To the west, they overlook the Beaver valley and the great rock-escarpment beyond and, on the east, the more gentle valley of the Spillimacheen river, presenting numerous grassy openings and scattered ponds. Again beyond, appear the brown rock-frayed summits of the Dog Tooth range. They are named respectively 'Bald Mountain East,' 7,564 feet and 'Bald Mountain West,'

7,292 feet in altitude. Camp was now carried southward some six miles and pitched in a beautiful park-like tract where opens and groves of spruce trees were interspersed. The same day, a station was occupied on the summit of a sharp peak immediately east of the divide between Grizzly creek and Spillimacheen river. On the upper slopes, which were open grass-land, were seen the location stakes of the 'Copperstain' and 'Bluebell' mining locations. The station is named 'Copperstain' and is at an altitude of 8,613 feet.

Four days of broken weather followed and quite a lot of snow fell. We managed, however, on the 17th, to occupy two stations some five miles further south, opposite the Grand glaciers and Beaver Overlook. Their altitude is respectively 7,436 and 7,906 feet. They have been named 'Grand Glaciers No. 1' and 'No. 2.'

The camp was now taken back to the summit of the pass. On the 19th, a station named 'Bald Mountain North No. 1' was occupied, altitude 7,651 feet; and on the 20th, two other stations named 'Bald Mountain South No. 1' and 'No. 2,' altitude respectively, 7,311 feet and 7,651 feet.

This practically closed the survey. On the 21st, we returned to the railway at Bear Creek, making the distance in six hours as compared with two days when coming in. There was, of course, no chopping to be done on the return trip. While the outfit was being taken in, a station named 'Bald Mountain North No. 2' was occupied with the camera, altitude, 7,663 feet.

The plateau of Bald mountain is well worthy a visit. It may easily be reached from Bear creek by the trail we travelled, in six hours, provided the trail is kept open. It extends southward about ten miles, from opposite Mt. Sir Donald to the Grand glaciers and is bordered on the south by the Spillimacheen mountains. The northern portion consists of shallow valleys of open grass-land, lying between rock-ridges presenting

The Lungapur Tea Plant (*Lotus gandavensis*).

at the surface broken fragments mingled with shale. These ridges cross the mountain transversely, are parallel to one another and suggest that the shallow valleys between have been carved out by glacial action. In the valleys are scattered small ponds. The crest of the plateau lies close along the valley of the Beaver river and the ground falls gently from the crest to the edge of the valley of the Spillimacheen river, which lies at a very much greater altitude than the Beaver river and flows in an opposite direction.

The south portion of the plateau is more broken and rocky. It presents bunches and clumps of spruce timber, interspersed with opens of grass-land. Shallow troughs cut in the rock are frequent, and ledges of smooth worn stone again show distinctly the action of glaciers. During the summer months, this would be a paradise for botanists and the mountain flora is magnificent. For artists and photographers, the stupendous rock-escarpment on the west side of the Beaver river, rising in sheer precipices to sky-line and flanked by giant buttresses, the long array of shining glaciers hanging between them and the many silver streams they send to water the forests of dark blue, rising upwards from the river's edge, may furnish inducements that would make a few days' camping in this delightful region the experience of a lifetime. For hunters, the locality is not without attraction: caribou are plentiful and several herds were seen in the park lands of the southern portion. Where the snow had fallen and the ground was covered by a white shroud, animal tracks of all kinds were visible crossing and recrossing in every direction. Among them were the tracks of several bears of no small size.

By following the trail up the Beaver valley several points of interest may be reached, viz. :—The Duncan and Beaver glaciers, which form the respective sources of the river bearing their names, the Grand glaciers and Glacier Circle. The last, a most beautiful spot in summer time, where picturesque clumps of spruce are set in grassy opens and little lakelets are hidden

here and there. All around are crystal ice-falls separated only by rocky ridges extending upwards to summits capped with snow. It is not always thus, however, for during our stay, the circle was filled by torn and twisted clouds and avalanches poured from above, keeping up a constant roar resembling thunder.

The 22nd October was spent in packing and loading the outfit and ponies on a car, and on the 23rd, the camp was broken up and the party returned to their respective homes. The white tents and busy camp life that had for so long a time been a feature of the Rogers pass summit was a thing of the past.

In the accompanying topographical map,* the elevations are in feet above sea-level, as deduced from the levels of the Canadian Pacific railway carried from ocean to ocean. These, accompanied by an excellent profile, have been carefully supervised and tabulated by Mr. James White, Geographer to the Department of the Interior. Copies of the tables, as far as they refer to the Selkirks, and of the profile from Winnipeg to Vancouver, are here appended.

I have sent a list of animals, birds, trees and plants noticed to Professor John Macoun, Dominion Naturalist and Botanist, who has kindly prepared a few notes, dealing with the zoology and botany of the region, to accompany this report.

I am also greatly indebted to Mr. R. F. Stupart, Director of the Meteorological Service in Canada, for an article relating to the climatic influences that affect the mountains generally. It will be found of great interest and assistance in explaining many phenomena noticed by the traveller.

*The maps, diagrams and panoramas to accompany this volume will be found in pocket (Volume II).

Mr. H. B. Muckleston, for some time one of the company's engineers, has been good enough to prepare a description of the road through the Selkirk range, dealing with it from a more technical point of view than falls within my province. His description is accompanied by some views of the bridges referred to and drawings of several of the various types of snow-sheds.

Mr. Albert L. Rogers, nephew of Major Rogers, has very greatly obliged me by writing an account of their first trip up the Illecillewaet valley, and the finding of Rogers pass, in 1881. It appears in the appendix.

I have also added a table of elevations of some of the better known points as deduced from the records of the survey together with a list of first and second ascents as far as I have been able to obtain information concerning them. A copy of the fire regulations and game laws of British Columbia, which last may prove of interest to sportsmen, is likewise appended.

PART II.

TRAVEL AND EXPLORATION

A BRIEF REVIEW

THE EARLY EXPLORERS.

CHAPTER I.

THE EARLY EXPLORERS.

THE Selkirks form an important section of the Cordilleras, a chain of mountain ranges occupying the western portion of the North American continent. They were once a part of the apex or crest of the chain, and reared their serrated and snow-capped summits above the prehistoric ocean, whose their neighbours, the Rockies, were as yet unborn beneath the ice-bound bosom. The great convulsions of nature that, in the course of ages, evolved the eastern range from the interior of the earth's

cooling crust and shifted the continental divide, relegated the Selkirks to a subordinate position and left only their older archæan formation to tell the tale.

In geographic position, the range occupies the great loop of the Columbia river formed by the stream from its source in the Columbia lakes till it crosses the 49th parallel of latitude, the boundary line between Canada and the United States. From the Columbian lakes southerly, the Kootenay river may be said to have defined the eastern boundary. How far the range extends beyond the 49th parallel is a matter of some doubt, although it has been assumed that, either wholly or in part, the Kootenay river defines the southern limit. Of late years it has been found necessary to treat it more in detail and several minor ranges have received names, notably the Purcell range lying in the bend of the Kootenay river east of Kootenay lake, the Kokanee range west of that lake, the Dog Teeth mountains, the Spillimacheen mountains, the Moyie mountains and, in still greater detail, the Hermit range, Sir Donald range, Dawson range and others.

Concerning the geographical position of the Selkirks, Mr. W. A. Baillie-Grohman, an old and experienced traveller and explorer, as well as a promoter of large interests in the Kootenay district, writes in the *Field* of May 11, 1889, under the title 'Seven Years' Pathfinding in the Selkirks of Kootenay,' as follows:—

'It must be remembered that this vast range occupies almost the entire Kootenay district, a political division of British Columbia very nearly as large as England. The Selkirk range, commencing at the mouth of Canoe river (the famous old Athabasca pass, or Rocky mountain portage of Hudson's Bay Company days) and extending southward to the great bend of the Kootenay river, is 200 miles long.

'In shape this mass of mountains is not unlike a huge horse-shoe, with the open end towards the south, or United States

Tree Sycamore Indoor (*Platanus Occidentalis*)

Inside this horseshoe is situated one of the three great valleys of the Kootenay district—the Lower Kootenay valley and Kootenay lake,—while the two other great depressions, namely, the Upper Kootenay valley and the Columbia river valley run round the outside of the horseshoe, isolating the Selkirks from the Rocky mountains to the east and north and from the Gold range to the west, and thus producing what is probably an unique instance, i.e., a large stretch of mountain country 300 miles long, and situated about 400 miles inland, for that is the distance between Kootenay and the Pacific ocean, made by the hand of man into an island as completely water-girt on every side as in any little islet on the Thames. Nature and not the hand of man has, of course, contrived the largest part, indeed, almost the entire of this singular trick, by making two large navigable rivers, which start from two points only a mile and a quarter apart (mark this latter fact) take for the first 150 miles of their respective courses entirely opposite directions; the one (Columbia) flowing due north and the other (Kootenay) running due south. After keeping up the indicated directions for the first stated distances, both streams, now swollen to majestic proportions by numerous tributaries that have poured into them from the mountains, which inclose their courses, suddenly, as if sorry to run away from each other, take abrupt and complete turns, until finally, after each having flowed 150 miles more, the two rivers actually meet and mingle their waters forming together the great Columbia, the largest river of North America Pacific Coast. The stretch of country inclosed by these two rivers is entirely occupied by the Selkirks, and the sunny Swiss-like valleys and lakes that lie in their embrace; while the only water-link missing to make of it a complete island is, or rather was, that mile and a quarter wide strip of land which separated the two rivers at their starting point. I had been struck with this singular orographical feature when I planned out my first

little expedition to the Kootenay in the map rooms of the Geographical Society, Foreign Office, and British Museum, and while I found that all the travellers who had visited the spot and left any record behind them (their names could be counted on one's fingers) had noticed and expressed surprise at this singular configuration, none appeared to have sufficient acquaintance with what was then a perfectly wild country to realize the future importance of creating a navigable connection by means of a canal between these two rivers; the easy nature of the intervening ground, a perfectly level flat raised only a few feet over the water, making the project, as I found on my first visit to this then immeasurably remote spot, a very feasible one from an engineer's standpoint.

'To-day the hand of man, in the shape of sundry Chinamen and white navvies, has accomplished the work, and a canal of sufficient depth and width to allow small shallow-draft river steamers to pass through it, from one river to the other, makes an island of the great Selkirks chain.'

The first general map on which the Selkirks appear is that of David Thompson, astronomer and surveyor, made by him during the years 1813 and 1814 for the North-West Fur Trading Company, in whose employ he was. It is the result of twenty years' surveys and discoveries from 1792 to 1812, and reaches over an enormous extent of country, embracing fifteen degrees of latitude and forty degrees of longitude, or from Sault Ste. Marie at the outlet of Lake Superior to the Pacific ocean—two-thirds of the entire distance across the North American continent—and from the headwaters of the Mississippi, very nearly to Great Slave lake.

It is the first attempt to map the Great Western Territories, the mountains and British Columbia, or New Caledonia as it was then known, a name given to it by Simon Fraser of the North West Company in 1808. Taking into consideration the vastness of the country, the difficulties of travel, hostile Indians

Panther in a Tree

and the fact that practically but one topographer was engaged upon the work, the results obtained by this indefatigable and untiring man are marvellous, and in the main accurate. A copy of a portion of the map is appended.

While sparse and inaccurate in detail, the main geographical features are laid down in relative position with a considerable amount of truth, the result of innumerable observations for latitude and longitude taken, individually and in series, upon every possible opportunity. The only methods of survey rendered possible by the rapidity and extent of his operations—probably a magnetic compass for direction and the rate of travel for distance—would, of themselves, compel the taking of a large number of astronomical observations, which he seems religiously to have done, using a sextant for the purpose.

By reference to the map, it will be seen that the Selkirk range of the present day is shown as 'Nelson's mountains,' and the high mountain opposite the site of Fort Kootenay, a trading post established by Thompson in 1807 about a mile below the lower of the Columbia lakes (indicated on the map by a dot and the letters 'N. W. Co.'), as Mt. Nelson. In 1805 the memorable battle of Trafalgar had been fought and Nelson's thrilling signal 'England expects every man will do his duty' was still ringing in Englishmen's ears. It was doubtless in honour of the great admiral that Thompson bestowed his name upon this mountain, and incidentally upon the range of which it formed, from his point of viewing it, the most striking characteristic. In his map of the Rocky mountains, published in 1886, the late Dr. G. M. Dawson shows the altitude of this peak as 10,000 feet, an elevation that, seen from the Columbia river, would probably give it a supreme height above its fellows. The Kootenay river of the present day is here shown as McGillivray's river, while close beside are seen Duncan's mountains, now known as the Hughes and Galton ranges; both were probably named by Thompson in honour of members of the

North West Company. It is a pity that the former has not been retained.

Until the advent of the British Columbia Government surveyors and explorers in 1865 the interior of the Selkirk range was practically an unopened book. Prior to that date, travel had touched it only on the outskirts. Although the Mackenzie river had been discovered and explored in 1789 by Sir Alexander Mackenzie, one of the most prominent partners of the North West Company, and the Fraser river had been travelled over for part of its course by the same intrepid explorer in 1793*, it was not until 1807 that the Columbia river was reached by the explorers of this great company.

The honour is due to Mr. David Thompson. A short but graphic sketch of his life may be found in an exceedingly well written paper prepared for the Royal Society of Canada by Sir Sandford Fleming, entitled 'Expeditions to the Pacific.' It appears in Vol. VII., Sec II. of 1889. In substance, the portion of the sketch of interest to the subject in hand is as follows:—

He was a Welshman; born in 1770; educated at the Grey Coat School, London; entered the service of the Hudson's Bay Company in 1789 and proceeded to Fort Churchill where he remained five years. The succeeding nine years he was engaged in making surveys of the Nelson, Churchill, Saskatchewan and their tributaries; frequently visited York factory, the company's headquarters, during that period. He joined the North West Company in 1797, when he went to Grand Portage near Lake Superior and was appointed astronomer and geographer to the company. In 1800 Mr. Thompson entered the Rocky mountains in latitude 54°, probably in the vicinity of the pass

* The Fraser was not explored throughout its length by Mr. Simon Fraser of the North West Company, in 1808, and received its present name on his account, being known prior to that date as the Jackonet river.

The Summit of the Rockies.

followed by the Canadian Pacific railway and descended one of the northern branches of the Columbia river, which he called McGillivray's* river; he was then driven back by Indians and compelled to recross the mountains. In 1807 Mr. Thompson was the first to go through the Howse pass by which route he reached the Columbia river; he then ascended to the Columbia lakes and built Fort Kootenay. In 1808 he descended Kootenay river to Kootenay lake, where he entered into trade relations with the Flathead Indians; he returned by another route to Fort Kootenay and descended the Columbia to Blackberry† river, returning by the Howse pass to Rainy Lake House, which he reached August 2. August 4, he again started west, arriving at the Columbia, October 3. In his note he speaks of the Rapid river, now Kicking-Horse river. It would appear that late in the autumn of 1810, he ascended the Athabasca river to its source and crossed the mountains by the Athabasca pass to the Columbia, arriving early in January. He spent the rest of the winter at the mouth of Canoe river and in the spring of 1811 left for the mouth of the Columbia. He now ascended the Columbia river to its source, crossed McGillivray's portage,‡ descended the Kootenay river and thence by the Pend d'Oreille and Spokane rivers, reached the falls of the Columbia, known to the Indians as Ilthkoyape, the site of Fort Colville, and followed the main river to the coast. He was kindly received by the officers of the Pacific Fur Company, who were then establishing Fort Astoria (near the mouth of the Columbia). He returned by way of the Arrow lakes and Columbia river to the mouth of Canoe river. Mr. Thompson was the first civilized man to traverse the main stream of the Columbia, certainly

* Kootenay river of present day.

† Now known as Blackberry river.

‡ Between the Upper Columbia lake and Kootenay river—about one mile and a half.

that portion of it above Fort Colville, to its source. He died in 1857 at the age of 87 at Longueuil opposite Montreal, in extreme poverty.

The sketch closes with the following note:—'Some of the facts above given are from MSS. now in the possession of Mr. Charles Lindsay of Toronto, giving an account of Mr. Thompson's travels. It is well worthy of publication. An outline of some of the journeys of Mr. Thompson was submitted to the Canadian Institute by Mr. J. B. Tyrrell, March 3rd, 1888.' Mr. Tyrrell's sketch was condensed from the field note-books and journals of David Thompson, which are preserved in the office of the Crown Lands Department of the province of Ontario, together with the original draft of the map of which the portion here reproduced is a copy.

It may be added that a very full and absorbingly interesting account of many of David Thompson's travels and doings will be found in the work of Dr. Elliott Coues, published in 1897 by Francis P. Harper of New York. It is entitled 'New Light on the Early History of the Greater Northwest' and is composed of re-written copy of the manuscript journals of Alexander Henry, fur trader, and David Thompson, official geographer and explorer to the North-West Company, with copious notes by the author.

The explorations and discoveries of David Thompson extended the operation of the North-West Fur Trading Company to the western side of the mountains and opened up communication with the Indians inhabiting the country tributary to the Columbia and Kootenay rivers. His ascent of the Athabasca river to its source in 1810 and descent of the Wood river to its junction with the Columbia at the mouth of the Canoe river, which he named, and where he spent the winter and established a post recorded as 'Boat Encampment,' made known the route that subsequently, under the title of 'Athabasca pass,'

became the travelled path across the mountains and formed the connecting link between the vast territories lying on the eastern and western sides of the Great Divide.

This pass by the headwaters of the Athabasca river and that known as Howse pass, connecting the headwaters of the Blaeberry river with those of the North Saskatchewan, formed the two principal highways by which trade was carried on with the Indian tribes of southern British Columbia, and communication kept up with distributing headquarters on the eastern side of the mountains. The depot known as 'Boat Encampment' was situated at the extreme northerly point of the Columbia river where it is joined by Canoe and Wood rivers, about eighty miles from Revelstoke in a straight line and probably one-half that distance more by the stream. Blaeberry river meets the Columbia nearly half way between Golden and Donald.

In the winter of 1812-13, Alexander Henry,* a partner and fur trader of the North-West Company, also a friend and companion of David Thompson, appears to have been at Henry House, which bears his name. It is situated near the source of the Athabasca river at the junction of Miette creek. In 1813 he appears to have descended the Columbia from Boat Encampment to Fort Astoria, near its mouth, where he is recorded as having arrived on the 15th of November, 1813. Unfortunately, there is a gap in Henry's manuscript journal as found in the Parliamentary library at Ottawa, and between the middle of May, 1811, and the 15th November, 1813, the chain of record is broken, his journal opening again at Fort Astoria on the latter date. Henry never returned across the mountains. He was drowned on the 22nd of May, 1814, while crossing the

* For travels and doings of Alexander Henry while in the employ of the North West Company see Dr. Elliott Coues' 'New Light on the Early History of the Greater North West,' published in 1897 by Francis P. Harper of New York.

Columbia river in a boat from Fort George, as Astoria was rechristened at the time Capt. Black of H.M.S. *Racoon* took possession of the country and the Fort in the name of His Britannic Majesty, December 13, 1813. The fort had been established in 1811 by the Pacific Fur Company, promoted the same year by John Jacob Astor of New York, but was shortly afterwards (1813) transferred to the North-West Company. A full account of Mr. Henry's travels, together with much information relative to the doings of those times, may be seen in Dr. Elliott Coues' work, previously mentioned.

The routes above referred to formed the main line of communication between the east and the west until the advent of the Canadian Pacific railway. They were travelled almost entirely by members of the North-West Company, up to the time of its amalgamation, in 1821, with the Hudson's Bay Company, and from then on by the representatives of the united interests under the name of the latter company. Very many men of standing and record in the annals of fur trading have passed along these rough beaten paths through the wilderness. Often have the recesses of the mountain fastnesses echoed to the stirring strains of a French Canadian camp song, and the camp fire, flickering among the dark shadows of the pines, has lighted up the bronzed and strikingly characteristic features of bourgeois, voyageur and redskin; men who lived hand in hand with Nature, to whom the trackless forest was an open book and the surging rapids an everyday pastime.

Of these journeyings to and fro an interesting account has been published by Gabriel Franchère, entitled "Narrative of a Voyage to the Northwest Coast of America, from 1812 to 1814." He was an officer of the Pacific Fur Company, who, at the time of its absorption by the North-West Company, left the service and returned eastward viâ the Athabasca pass.

Another officer of the Pacific Fur Company, Ross Cox, 1812-1817, who subsequently joined the North-West Company, has also written an account of his trip through the pass. To the foregoing may be added the following narratives:—The journeyings of John MacLeod, chief trader in the service of the united Hudson's Bay and North-West Companies, who accompanied by his wife and children crossed the Athabasca pass in 1822; Sir George Simpson's trip in 1825; the travels of Alexander Ross; and the early explorations of David Douglas, the celebrated naturalist and botanist by whom the mountains, 'Hooker' and 'Brown,'* situated one on either side of the Athabasca pass, were first named. Records have also been left by the renowned artist, Paul Kane, who travelled the pass in 1846 and again in 1847 when on his way to the lower Columbia river district, there to depict the Indians dwelling by that mighty waterway, their appearance, habits and customs; and thus to supplement the written records of the earlier travellers: Thompson, Henry, Franchère and others.

There are doubtless many illustrious travellers by this highway through the forest and over snow-clad mountains of whom records are extant, but the above will serve to show that although their innermost recesses were still unexplored, yet from the date of earliest civilized knowledge of the great western regions, travellers gazed upon the range of snowy peaks—then known as Nelson's mountains, now as the Selkirks—which was destined to become famous for its mineral wealth, its timber resources and wherever Alpine climbing and scenery are of interest.

* At the time David Douglas named these mountains, he supposed to them a height that "does not appear to be less than 16,000 or 17,000 feet above the level of the sea." This statement in his journal has caused them to be placed on most published maps, even at the present date, as two of the principal peaks of the Canadian Rockies. Expeditions in 1887 and 1888 by Professors Coleman and Stewart of Toronto, Ontario, reduced the elevation of Mt. Brown to 9,050 feet above sea-level and, according to Mr. Douglas' Mt. Hooker is the lower of the two.

The first departure from the beaten route of which a detailed account is given, was made by Sir George Simpson, Governor-in-chief of the Hudson's Bay Company's territories in North America. His 'Narrative of a Journey Round the World during the Years 1841 and 1842' is deeply interesting and vividly graphic in description. A brief synopsis of the part bearing upon the subject may be of interest :—

He started from London on the morning of March 3, 1841, and proceeded to Montreal; thence by boats, viâ St. Lawrence and Ottawa rivers to Lake Nipissing; down the French river to Lake Huron and up that lake and Lake Superior to Fort William; thence, viâ the Kaministiquia river, Rainy river, Fort Francis, Lake of the Woods, Winnipeg river, Red River Settlement (Selkirk), Fort Ellice, Fort Carleton and Saskatchewan river to Edmonton House, the company's distributing headquarters for the mountain section and regions beyond. Here he arrived at the end of July. A reference to the accompanying map of the Dominion of Canada will enable this route to be followed.

When it is considered that from Montreal westward to Edmonton, a distance of very nearly 2,500 miles by the railways of the present day, the travelling was accomplished to the Red River Settlement either by canoes or batteaux, otherwise known as York boats;* and beyond that point, across the plains, on horseback to Fort Carleton, where batteaux were again brought into requisition, some idea may be formed of the magnitude of the undertaking.

He left Edmonton on the 28th July and, travelling a little west of south with a band of forty-five horses, crossed Battle river, which joins the Saskatchewan a short distance east of

* Long flat-bottomed boats used by the Hudson's Bay Company sharp pointed at each end, capable of holding fifteen to twenty persons and their outfit, easy to paddle and light to portage.

27 THE MOCCASIN PLANT (*Cypripedium pubescens*).

Fort Pitt. July 29, he camped on the banks of Gull lake,* 'a fine sheet of transparent water almost twenty miles in length by five or six in width. The weather continued to be exceedingly warm, the thermometer standing at 83° in the shade, and flies of every description, from the bulldog, which takes a bit from man and beast, to the diminutive moustique (sandfly) annoyed to an almost unsupportable degree ourselves and our cattle.'

As they journeyed, like most of the early travellers, they lived by the way, carrying only a small supply of pemican† as a reserve, and depending chiefly upon the result of the chase for their daily food. In the prairie section, where at that time the buffalo were very numerous, it was a matter of little difficulty; but in the mountain regions, where the scarcity of game at low altitudes was a source of much trouble, it was a matter of great concern. Referring to the buffalo, Sir George Simpson writes: 'The excitement of such a hunt cannot possibly be appreciated by your civilized sportsman, inasmuch as his larder is not materially interested in the question of failure or success.'

Continuing south, he crossed 'Red Deer river' and travelling up the river La Biche (Little Red Deer river of the present day) entered the foothills along the eastern slope of the Rocky mountains. 'In the way of eating we had now little to expect beyond our own stores of pemican and dried meat. Our supper of to-day was the first meal at which we had not fresh viands of some kind or other and we had no reason to expect any considerable improvement for some time to come.'

Here, he speaks of a man being lost and though fifteen signals had been fired, not one was heard, 'and this was extraordinary, as the report of one's own gun appeared to reverberate

*Situated a little east of the Calgary and Edmonton railway, between Red Deer and Wetaskawin, but not nearly so large as stated by Sir George Simpson.

†A mixture of preserved buffalo meat sewn up in skins in bundles of convenient size for carrying.

through the woods like the discharge of a heavy piece of ordnance.' The short distance sound carries in the mountains, owing to the many interposing obstacles and the difficulty of locating the true direction from which it comes on account of deflection, is a matter well worth considering before separating at any time from your party when travelling in wooded valleys or along mountain sides grown with timber. This is particularly the case when descending slopes covered by forest; ascending you cannot well lose your way—all roads lead to Rome; descending there is but one and, missing that, you are lost or compelled to follow a circuitous route.

The party camped at one of the sources of the river La Biche (not the main source, which is found farther to the northwest) 'and bade adieu to that stream which during the last three days had been crossed at least forty times. One of the overhanging peaks, from its bearing a rude resemblance to an upturned face, is called the "Devil's Nose."* The path which we had been following was a track of the Assiniboines carried, for the sake of concealment, through the thickest forests. The Indians and Peechee (his half-breed guide) were the only persons that had ever pursued this route, and we were *the first whites* that had attempted this pass of the mountains. . . . In the morning we entered a defile between mountainous ridges, marching for nine hours through dense woods. This valley, which was from two to three miles in width, contained four beautiful lakes, communicating with each other by small streams; and the fourth of the series, which was about fifteen miles by three, we named after Peechee as being our guide's usual home.' This lake is now known as Lake Minnewanka or Devil's Lake, one of the principal attractions of the Canadian Rocky Mountains park. It is nine miles from the village of Banff and reached by a well-made road; there is good fishing and accommodation to

* The Devil's Head, north of Banff.

be had at the lake, and those with an imaginative turn of mind can readily picture Sir George Simpson and his crew of voyageurs making the first trip by white men along its beautiful shores. The trail travelled by his party crossed from the source of the Little Red Deer river to the Devil's Gap and through the pass to the valley of the Bow river and the Vermillion lakes. A mountain in the vicinity has been named 'Peechee's mountain' by the late Dr. George M. Dawson, who in his map of the Rocky mountains, published in 1886, has done so much to assimilate and properly locate the geographical nomenclature of the early explorers. Peechee, a half-breed, was a chief among the Rocky Mountain Crees. He was employed by Sir George Simpson as a guide during a portion of his trip across the mountains.

The party now crossed two branches of the Bow river—Cascade river and Forty-mile creek. 'From the top of a peak* that rose perpendicularly at least two thousand feet, there fell a stream of water, which, though of very considerable volume, looked like a thread of silver on the gray rock. It was said to be known as "The Spout" and to serve as a landmark in this wilderness of cliffs. One peak presented a very peculiar feature in an opening of about eighty feet by fifty which, at a distance, might have been taken for a spot of snow, but which, as one advanced nearer, assumed the appearance of the gateway of a giant's fortress.'†

They now reached the Bow river traverse, or crossing, and from a point opposite Hole-in-the-wall mountain ascended one of the sources of that stream, shown on Dr. Dawson's map as Heely's creek, and so reached the height of land—'the hinge as it were between the eastern and western waters.' The route up this stream is fixed by Dr. Dawson in the following words:—

* Cascade mountain.

† Hole-in-the-wall mountain, the opening is seen from the train in passing.

'He crossed the watershed range by the pass designated by his name on the map,* as rendered evident by the time (seven hours) occupied in travelling from the Bow river crossing to the summit. Had he gone by the Whiteman's pass, the travelling time would have been much greater, by the Vermillion pass much less than that specified.' (Geological Survey report, 1885.)

The pass is now known as 'Simpson's Pass.' Speaking of it, Sir George Simpson says: 'Still the pass was inferior in grandeur to that of the Athabasca portage. There, the road, little better than a succession of glaciers, runs through a region of perpetual snow, where nothing that can be called a tree presents itself to relieve and cheer the eye. There too, the relative position of the opposite waters is such as to have hardly a parallel on the earth's surface; for a small lake, appropriately known as the "Committee's Punch-bowl," sends its tribute from one end to the Columbia and from the other to the Mackenzie.'

At the summit of the Simpson pass he discovered 'the very heather of the Highlands of Scotland.' It is probable that the plant thus referred to is the pink flowering heath (*Bryanthus empetriformis*) so frequently seen on all the lower summits throughout the Rocky and Selkirk mountains, and which much resembles Scotch heather. Sir George Simpson had evidently some doubt in the matter, for he says: 'We made another discovery, about which there can be no mistake, in a troublesome and venomous species of winged insect, which in size and appearance might have been taken for a cross between the bull-dog and the house fly.' Most travellers in the mountains have made the acquaintance of this detestable insect, the deer fly. The deliberate manner in which it settles on the back of the hand

* Dawson's geological map of the Rocky mountains, published in 1886.

between the fingers and remains there until crushed is most obnoxious.

Very soon after commencing the descent of the western slopes a change was noticed in the climatic conditions and in the growth, for he writes: 'On resuming our march, we had not descended half a mile before we felt a difference in the climate, a change noticed by all travellers in these regions, and the trees also were of fine growth. Whatever may be the reason of the sudden alteration, the same clouds have been known to clothe the eastern side with hail and snow and to refresh the western with gentle rain.'

From the summit of the Rocky Mountains range the descent to the Kootenay river was made by the pass to which his name has been given by Dr. Hector, following the Simpson river to its junction with the Vermillion and the latter stream to the Kootenay. Down the Kootenay river southerly, at a distance of some twenty miles, a crossing was made to the Columbia valley by way of the Sinclair pass, along Berlands creek, a tributary of the Columbia river. Berland was the name of the guide sent from the company's post at Fort Colville to meet Sir George Simpson with a relay of horses. He was expected at the Bow river crossing, but the meeting did not take place until in the vicinity of the above-mentioned creek. A prominent feature of the canyon near the mouth of this creek is shown on Dr. Dawson's map as the 'Red Gates' and referred to by Sir George Simpson as the 'Red Rock.' He says: 'At one very remarkable spot, known as the Red Rock, our path climbed the dry part of the bed of a boiling torrent, while the narrow ravine was literally darkened by almost perpendicular walls of a thousand or fifteen hundred feet in height; and to render the chasm still more gloomy, the opposite crags threw forward each its own forest of sombre pines into the intervening space. The rays of the sun could barely find their way to the depths of this

dreary vale so as to render the darkness visible: and the hoarse murmur of the angry stream as it bounded to escape from the dismal jaws of its prison, only served to make the place appear more lonely and desolate. We were glad to emerge from this horrid gorge, which depressed our spirits even more than it overawed our feelings.'

The Columbia river was now followed to its source in the Columbia lakes and the Kootenay portage traversed, for Sir George Simpson writes: 'We breakfasted near a lofty mountain which was to form our afternoon's mark. Its base was marked not only by the Kootenais, but also by the Columbia properly so called, the former sweeping far to the south and the latter still further to the north in order to unite their waters a little above Fort Colville.'*

While at the Upper Columbia lake, he visited the hot springs near its northern extremity on the east side, referring to them in the following terms:—'Before starting for the day, Berland conducted us to three hot springs, about three miles distant, which doubtless caused the phenomenon in question (a yellow encrustation on the stones in a creek flowing by their camp). The waters tasted slightly of alum and appeared to contain a little magnesia; and, although we neglected to take our thermometer with us, yet, on returning to camp, we estimated the three temperatures respectively at about 90°, 100° and 120°.' In the annual report of the Geological Survey of Canada for 1885, Dr. Dawson mentions the springs, as follows:—'It is about half a mile east of the trail, on the slope of a hill, and issues in several places from the summit and sides of a rounded calcareous knoll formed by its deposit. The main outlet, at the summit of the knoll, has produced a round basin, which measures about eight feet by four and is two feet deep, forming an admirable natural bath. The discharge at the place

* In all likelihood the Mt. Nelson of Thompson's map.

is probably not less than twenty gallons per minute and the temperature of the water at this (the hottest) point was found to be 112° F.'

From the Columbia lakes the party continued over the height of land to where the valley is entered by the Kootenay river. At this point has sprung up a village, until recently called 'Grohman,'* at the southerly end of the canal joining the two water systems, which has, by the enterprise of Mr. Baillie-Grohman, converted the Selkirk range into an island.

The Kootenay river was followed along its eastern bank to at or near Wild Horse creek, where now the mining town of Fort Steele is rapidly growing into a creditable existence and is situated but a few miles from the Crows Nest branch of the Canadian Pacific railway. He here crossed the river and struck across country to Moyie lake, which he refers to as 'Grand Quête Lake' (probably at that time a special gathering place for the Indians of the vicinity when on hunting expeditions), and followed the river flowing from it to the crossing known as the 'Kootonais Traverse.' 'In the afternoon we skirted along the shore of the Grand Quête lake, of almost twenty miles in length and four in width.'† From the 'Kootonais Traverse' he crossed to Kulespelm (Pend d'Oreille) lake and taking to flat-bottomed batteaux proceeded down the Pend d'Oreille river to a rendezvous, where horses were in waiting, and by this means reached Fort Colville on the Columbia river.

Sir George Simpson was noted, when travelling, for his rapidity of movement. He often covered one hundred miles in a day. In the present journey, from the Red Deer to Fort Edmonton the average was fifty miles daily; for the balance of the distance to Fort Colville, not quite forty. The fact, however, must be taken into consideration, that as Governor-in-chief

* Now I believe, incorporated in the larger site of Kootenay city.

† The Moyie lakes at an outside estimate do not exceed ten miles in length, inclusive of both lakes, or two miles in width.

of the Hudson's Bay Company, he had unlimited command of men and horses to the utmost resources of the company. The same ability to cover long distances, in comparatively short periods, may be noticed in the accounts of the travels of David Thompson and many of the travellers of early days.

Sir George Simpson's narrative of his journey in 1841 across the mountains is of much importance as the first detailed account of the Columbia and Kootenay rivers having been reached from the east by a route so far to the south. Although David Thompson is on record as having reached the latter stream as early as 1800, by one of its tributaries, heading somewhere near latitude 51°, there does not appear to be any detailed account of the route he travelled.

In his narrative, Sir George Simpson makes mention of a party of emigrants who came through from the west by way of the Kootenay river and one of the passes—probably the Whiteman's pass—through the mountains in 1841, under the guidance of an Indian named 'Bras Croche.'

It was some time during the year 1843 or 1844 that the Rev. Father P. J. De Smet, a Jesuit missionary, ascended the Kootenay river from Oregon and established the following mission stations:—St. Peters at Arrow lake, Assumption at Flathow (Kootenay) lake and the Holy Heart of Mary on the Kootenay river, just north of the 49th parallel of latitude. St. Francis Regis was established about the same time near Fort Colville.

In 1845, Father De Smet again ascended the Columbia river as far as latitude 50° 10' and then crossed a portage of 'two and a half miles'* (De Smet) to the Upper Columbia lake. In

* McGillivray's portage of Thompson. Baillie-Grohman puts the distance between the Upper Columbia lake and the nearest point of the Kootenay river at one mile and a quarter. Dr. Dawson the same distance at one mile and a half. The old portage route may have been longer.

A Snow Cap

his account of the journey, Father De Smet refers to having met here a French Canadian trapper named Marigeau, who had lived at the lake for twenty-six years. He was a native of St. Martin, district of Montreal, and had probably gone out in the employ of the North-West Fur Company of Montreal.

It is assumed that Father De Smet now proceeded down the Columbia river to the mouth of Berlands creek, up which he travelled to the summit of the Sinclair pass, between the Brisco and Stanford ranges (the same route as that followed westward by Sir George Simpson), and descended on the eastern side of the pass to the Kootenay river. He then followed down the Kootenay to the mouth of Cross river, which he ascended to the summit of the main range. Of the Cross river, Dr. G. M. Dawson says: 'This stream is called Tsha-koo-ap-te-ha-wap-ta by the Stoneys, and its name alludes to the circumstance related by them that some early traveller set up a cross in the pass not far from the summit.'*

The theory that Father De Smet crossed from the Columbia river to the Kootenay by way of the Sinclair pass, down the latter stream to the Cross river, up that stream and through the range by the Whiteman's pass is one first propounded by Dr. G. M. Dawson in the report already referred to. De Smet, in his book 'Oregon Missions and Travels over the Rocky Mountains in 1845-6,'† does not give any clue, but judging from the time he took from the Columbia river to the summit of the pass by which he crossed the main range, September 9th to September 15th, he must have journeyed by the route named.

At the summit of the pass, Father De Smet erected a cross, which he refers to as the 'Cross of Peace.'‡ This fact, in con-

* See Dawson's report (page 1B2a) in the annual report of the Geological and Natural History Survey of Canada, 1885.

† Published in New York in 1847.

‡ See De Smet's Oregon Missions (page 144).

junction with the Indian tradition before mentioned, would point conclusively to his having traversed the Whiteman's pass. The pass was so named by the Stoney Indians, owing to the fact that a party of white men had travelled through the mountains by that route—in all likelihood the party of emigrants in 1841 referred to by Sir George Simpson in his narrative; or else it was to the passage of De Smet that it owes its name. When Dr. Dawson explored the pass in 1885, an Indian pointed out to him the spot where the cross had stood.*

From the summit, Father De Smet descended the Spray river to the Bow river valley and visited the Assiniboine Indian encampments near the present site of the village of Morley, where he arrived in October, 1845. He spent some time in baptizing and preaching to these Indians and then proceeded northward to the Saskatchewan river, wintering at the Hudson's Bay Company's post at Fort Edmonton, where he continued his missionary labours. In May, 1846, he returned to the Columbia viâ the Athabasca pass, arriving at the mission near Fort Colville on the 29th May.

In his description of his visit to the Upper Kootenay valley, published in *The Field* of May 9, 1885, Mr. Baillie-Grohman refers to a Jesuit Indian mission with two fathers 'under the intelligent direction of Father Fouquet, who has been among the Kootenays for very many years.'

* See Dawson's report, 1885.

Pacific Express at Glacier, B.C.

CHAPTER II.

The Coming of the C.P.R.

IN 1857 an Imperial Commission was instituted by the British Crown to inquire into the suitability of the Colony of Canada for settlement and the advisability of constructing a transcontinental line of railway through British territory from the Atlantic to the Pacific ocean, and thus to connect the settlements of the east with those of the western coast and at the same time to provide a safer and more direct means of communication with the British possessions in the Orient.

The exploration was in charge of Captain Palliser, an officer of the Waterford Artillery Militia, assisted by Lieutenant Blackiston, of the Royal Artillery, and Mr. John Sullivan, as geographers, Dr. Hector (now Sir James Hector) as geologist and M. Bourgeau as botanist.

The field work of the commission extended over the years 1857 to 1860 inclusive. It covered an enormous tract of country lying, in latitude, between the British boundary line or 49th parallel of latitude and the height of land or watershed of the Northern or Frozen ocean, and in longitude, between the western shores of Lake Superior and the Pacific ocean.

In August and September of 1858 branch expeditions were extended into the Rocky mountains and proved very satisfactory. They established the fact that several passes through the mountains were available for horses, and by which a road could be made to connect the Kootenay and Columbia valleys with the plains of the Saskatchewan. The passes explored were four in number: The Kicking-Horse (Hector) pass, the Vermillion pass, the Kananaskis pass and the North Kootenay pass, all of which traversed the watershed of the continent in British territory.

In that year, Captain Palliser ascended the Bow and Kananaskis rivers to the Kananaskis lakes and arrived at the summit of the Rocky Mountains range. At a small lake on the divide, immediately west of the Kananaskis lakes, he found the waters flowing to the Pacific ocean and followed the stream, now known as Palliser river, to its junction with the Kootenay. In 1848 he had learned of the existence and location of this pass from a half breed named James Sinclair, who had been through the mountains by that route. Sinclair was encountered in the western Indian country of the United States. Of the summit between the valley of the Kananaskis, and the waters flowing to the Pacific ocean, Capt. Palliser writes as follows:—

29 Sir James Hector

'Very little vegetation appears along the summit of the water-shed, which is overspread with masses of stones and rocks, and the only animal which we have seen is the sifflour (Hoary Marmot), whose shrill whistle we heard for the first time close to our encampment of to-night. It inhabits crevices in the rock and, when full-sized, is not larger than the common badger of the plains. It is excellent eating when fat. There are two species of this animal, but one only was seen there by us. Its fur is of a mottled grizzly brown colour, but of little value to the trader; the fur of the other species is black, tinged with brown. The Sposshewass Indians make robes of sifflour skins, and these are almost the only covering they possess.' Via Palliser river (a tributary of the Kootenay), the Kootenay river, Kulespelm lake and Pend d'Oreille river, he reached Fort Colville.

The same year, Dr. Hector ascended the Bow river to a point near Castle mountain; then, by way of the stream shown on Dr. Dawson's map as 'Little Vermillion creek,' he travelled to the headwaters of the Vermillion river, and down the same to its junction with the Kootenay, which he ascended to the divide between it and the Beaverfoot river, and down that stream to its junction with the Kicking Horse river. On this journey, Dr. Hector and his party suffered very much from want of food, owing to the scarcity of game and the difficulties experienced by his hunters in obtaining it. The difficulty was probably due to the fact that most of the game is found at high altitudes, and the party travelling fast, the hunters were unable to ascend to a sufficient elevation above the valleys to meet with a plentiful supply. Near the confluence of the two streams, Dr. Hector received a severe kick from one of the pack-horses, which disabled him for a day. At the end of that time, owing to the stern necessities of hunger, he managed to push on up the river, which, in reference to the accident, was named the 'Kicking-

Horse.' Dr. Hector returned over the summit of the main chain by this route and thus became the discoverer of the Kicking Horse or Hector pass.

While Capt. Palliser and Dr. Hector were exploring the Kananaskis and Kicking Horse passes, Lieutenant Blackiston explored and reached the Kootenay river by the North Kootenay pass, via the south branch of the Old Man river and the Wigwam and Elk rivers. He returned to headquarters at Edmonton by the South Kootenay or Boundary pass, entering the mountains from the west by the Tobacco river and leaving them on the east by the Waterton river. In one of his reports Lieutenant Blackiston refers to a party of immigrants having gone through the mountains in 1854 by one of the southern passes.

On September 17, 1859, Dr. Hector reached the Columbia river by way of the Howse pass. The pass was first discovered by David Thompson in 1807, as previously mentioned. It connects the headwaters of the North Saskatchewan with those of the Blaeberry river, flowing to the Columbia. It was one of the main travelled routes of the North-West Company, and so called after an old and trusted employee, Jasper Howse, who for some years was in command at Rocky Mountain House, one of the company's depots, at the confluence of the Saskatchewan and Clearwater rivers on the eastern slope of the main range. He travelled over the pass in 1810. On the present occasion, Dr. Hector journeyed from Old Bow Fort up the Bow river, struck up Pipestone creek and, passing Mt. Hector to the east, crossed the divide (Pipestone pass) to Siffleur river, down which he travelled to the North Saskatchewan; he then followed the middle branch of that stream to the main divide and descended the Blaeberry river to the Columbia valley. From here, he followed the old travelled route up the east side of the Columbia river to the Columbia lakes and, keeping the east side of the Kootenay river to the Kootenay passes, crossed to

Kulespelm lake. He finally followed the Pend d'Oreille river, or Clark's Fork of the Columbia, to a point where, leaving the river, he crossed the Spokane plains to Fort Colville, the same route followed the year previously by Capt. Palliser.

Meanwhile, Capt. Palliser travelled down the Kootenay river, viâ Flatbow (Kootenay) lake, to Fort Colville and his assistant, Mr. Sullivan, explored up the Pend d'Oreille to Salmon river, which he ascended some distance; then crossed the divide and descended a stream to the Kootenay river, probably along the route followed later by the 'Dewdney trail' connecting the Columbia and Kootenay rivers. He now cut across to the elbow of the Choe-coos (Moyie) river, the stream spoken of by Sir George Simpson as 'Grand Quête' river, and ascended to its source in Moyie or Grand Quête lake, and from here proceeded eastward to within six miles of the Kootenay river, down which Dr. Hector was at that moment travelling on his way to Fort Colville.

Thus far, with the exception of Sir George Simpson and Mr. Sullivan, who passed through the branch spur of the Selkirks, now known as the Purcell range, along the Moyie lakes and river, there is no record of any progress into the interior of the main Selkirk range other than by Indians, who doubtless made many inroads, at least in the southern portion, by means of its exceptional waterways, in search of game. Nor must it be overlooked that most of the early travelling in these regions was by paths and trails previously mapped out and travelled by the Indian inhabitants, their lines of communication when passing to and fro on hunting expeditions. The Indian applies his natural ability in this respect in a wonderful manner and, as a rule, his selection of routes is seldom at fault. They furnish fair samples of engineering skill, while his knowledge of topographical formation, in which he is silently trained from his earliest youth, enables him to see at a glance the proper [illegible]

to look for a road. With, possibly, the exception of the Kicking-Horse pass, it is likely that the passes entered and recorded by Sir George Simpson and Capt. Palliser's parties were travelled Indian routes. To those journeying through the mountain wilds, the difference of an Indian trail and no Indian trail becomes very apparent.

As the result of his labours, Capt. Palliser submitted to the British Government what was practically the first detailed map of any portion of the Rocky mountains region. It embraced the area covered by his explorations and surveys. While accurate in generalities, it was crude in detail and the nomenclature was in considerable confusion, when viewed by the light of later knowledge. In 1871, a very much advanced map of the new province of British Columbia was issued by the Hon. J. W. Trutch, Chief Commissioner of Lands and Works and Surveyor General, in which many improvements appeared. This map is now out of print and I am indebted to the kindness of Mr. W. S. Gore, the Deputy Commissioner of Lands and Works, for the copy to which I have been able to refer.

It remained, however, for Dr. George Dawson, a prince among geographers, to evolve order out of semi-confusion. His geological map of a portion of the Rocky mountains, issued in 1886, has been little improved upon at the present date. It divides the main range into its component parts, applying the names already given where they properly belong and bestowing others upon the unnamed ranges and isolated mountain masses. It shows the principal tributaries of the main streams in their true relative position and places the whole, where error existed, in its very nearly correct latitude and longitude. In addition to the surveys of Capt. Palliser's expedition, the survey of the 49th parallel of latitude by the Boundary Commissions of 1858-1862 and 1872-1874, those along the route of the Canadian Pacific railway and Dominion Lands Surveys in the fast-

THE DOUGLAS FIR (*Pseudotsuga taxifolia*)

hills and along the Bow valley to Bow lakes, the map was compiled from traverse and track surveys by Dr. Dawson himself, assisted by J. B. Tyrrell and J. White, of the Geological Survey Staff, extending over the years 1883-4-5.

Although the exploration of Capt. Palliser covered the plains areas over which the Canadian Pacific railway and its branches now extend in many directions, and the Hector pass through the mountains, which was the one finally adopted, was discovered and reported upon favourably by one of his chief assistants, yet, after mature consideration, in his report published in the Imperial Commission papers of 1863, 'Vol. 39, Colonies,' he expressed his deliberate opinion in the following measured terms:—'I, therefore, cannot recommend the Imperial Government to countenance or lend support to any scheme for constructing, or, it may be said, forcing a thoroughfare by this line of route, either by land or water, as there would be no immediate advantage commensurate with the required sacrifice of capital, nor can I advise such heavy expenditure as would necessarily attend the construction of an exclusively British line of road between Canada and Red River Settlement.' Again: 'The knowledge of the country as a whole would never lead me to advocate a line of communication from Canada across the continent to the Pacific, exclusively through British territory. The time has now for ever gone by for effecting such an object, and the unfortunate choice of an astronomic boundary line has completely isolated the Central American possessions of Great Britain from Canada in the east, and almost debarred them from any eligible access from the Pacific Coast on the west.' And yet it is not denied that the Hector pass was a feasible route for a railway, for, referring to the discovery of that pass, we find in the above mentioned report: 'In that pass Dr. Hector has observed a peculiarity which distinguishes it from the others we had examined, viz.: the absence of any abrupt step at the commencement of the descent to the west. This led

him to report very favourably upon the facilities offered by this pass for the construction of a wagon road, and even the project of a railway by this route across the Rocky mountains might be reasonably entertained.'

The above deliberate opinions were published in 1863; a short two years afterwards, December 18, 1865, Mr. Walter Moberly laid the report from which the following extracts are taken, before the Hon. Joseph Trutch, Chief Commissioner of Lands and Works and Surveyor General of the Crown Colony of British Columbia:—*

'You will have seen by my last official report, written on the 10th September, ultimo, that I had succeeded in accomplishing one of the chief objects of the expedition of which I had charge, namely, the connection of the valleys of the Fraser, Thompson and Shuswap waters with those of the Columbia river, by a low pass,† suitable either for a wagon road or a railway; and that there was only a portion of the pass I had not actually been over. In a subsequent portion of this report you will also see that my anticipations with regard to that portion of the pass then not examined have been more than fully realized and that there will be no difficulty in locating a line of road, at a low level, from the shores of the Pacific to Palliser's Vermillion pass through the Rocky mountains, if the valley of the Columbia river, from the easterly terminus‡ of the above mentioned pass from Shuswap lake is followed. As the route by the valley of the Columbia would, however, necessitate a considerable deviation from the direct line sought, my next object was to find a way through the Selkirk range of mountains, with as little deviation from the above line as possible. I, therefore, sent Mr. Green to explore the valley of Gold creek, Mr. Turnbull the valley running in an easterly direction from the head of the

* *British Columbia Gazette*, 23rd December, 1865.
† The Eagle Pass.
‡ Opposite Revelstoke.

Upper Arrow lake, and proceeded myself up the valley of the Ille-cille-waut river, these being the only valleys by which I thought it at all likely the much wished for pass through these mountains could be obtained. I regret to say, we were all obliged to leave our several explorations incomplete, owing to the lateness of the season and the impossibility—principally on that account—of getting Indians to go far into these mountains. I may here state, judging from the character of the mountains on both sides of the valley of Gold creek, as reported by Mr Green, and that of the Ille-cille-waut, examined by myself, that should a further exploration of them result in the discovery of a pass at a low level, I think it very problematical indeed if it would be advisable to adopt either of them as the line for the main thoroughfare to the Vermillion pass in the Rocky mountains, as the valleys in places are very narrow, and the mountains on both sides steep and subject to heavy snowslides. . . But, having in view what I am convinced will be the great and ultimate object to be obtained—the opening of a through line of road to the valley of the Saskatchewan river, the benefits to be derived from which it is unnecessary to enlarge upon, as they must be apparent to all—I am much inclined to think, from the actual data now before me, that it will be better to follow the valley of the Columbia (from the recent explorations I think the bend in this river is much exaggerated on all present maps) from the easterly terminus of the pass from Shuswap lake, more especially when it is taken into consideration that it will be very desirable to construct the road along such line as will be most likely to ensure its being kept open for traffic at all seasons of the year. The adoption of this valley for a line of road will not only secure its being on a low level, as compared with the others, but it will also open up the whole of the country contiguous to it and afford easy access to its numerous tributary streams, particularly to the valley of Canoe river, or, as it is commonly called by miners who have prospected up the Columbia river,

the North Fork of the Columbia. . . . As the reports of Messrs. Turnbull and Green, which I will forward to you as soon as possible, will give detailed descriptions of the valleys explored by them, I shall merely give one of the valley of the Ille-cille-waut, up which I went. On leaving Mr. Turnbull at the mouth of this stream, I proceeded up its northerly or right bank, for a distance of about forty miles, at which point the river divides into two streams of nearly equal size, the general bearing of one valley above the forks, as far as it can be seen from that point, being north 14° east; that of the other nearly east.

"The latter valley was evidently one that, judging from its general bearing, would be most likely to afford a pass in the direction wished for. I, therefore, tried to induce the Indians I had with me, by every possible persuasion, to accompany me all the way across the Selkirk range, and make for Wild-Horse creek. (The Columbia River Indians would from the first only engage to go as far as the headwaters of the Ille-cille-waut.) All my efforts were, however, unavailing, as they affirmed that if we went on we should be caught in the snow, and never get out of the mountains. As I now found it would not be possible to complete the exploration of the easterly branch, so as to arrive at a definite conclusion as to its suitableness for a line of road throughout to the Upper Columbia, and as a partial exploration would only be a waste of time and money, for, should it be explored throughout at any future time, which I should recommend, the same ground would have to be traversed again, I decided to explore the northerly fork, and accordingly continued my journey, still keeping on the right hand bank until I reached a point about seventy miles from the mouth of the main river. The valley had been continually turning more and more to the north, and at the above point took a decided turn, its bearing then being nearly N W., and as the snow which had

been falling on the mountains for several days was but a short distance above the river bottom, I concluded to return, it being quite apparent that nothing further could be gained by a longer continuance in these mountains. . . . It appears to me that one of the most important works for the Government to undertake would be the opening of a good trail from the Upper Columbia through the Rocky mountains to the extensive open country which, from the best information I have been able to gather from various sources, extends along the easterly slope of that great dividing range. There is now a very large population spread over the country south of the boundary line, and it is rapidly increasing. With the mines of the Big Bend as an attraction, and a good trail by which animals could get over to the vicinity of those mines, large numbers of people would be certain to find their way into this colony; in fact, I am convinced that it is in this direction we have to look for the large immigration into the colony, and not by way of the sea.'

From the foregoing it will be seen that Mr. Walter Moberly and his assistants were the first of whom there is a record to penetrate the northern portion of the Selkirk mountains by way of the Illecillewaet and adjacent valleys. He does not appear to have had an opportunity to carry his exploration further, although in 1872 he crossed the range *for the first time* through a pass north of Rogers pass and travelled down the Gold creek valley to the Columbia river *en route* from his headquarters camp at the west end of the Howse pass for Victoria. His trip is referred to at greater length further on. It was not until sixteen years later (1881) that, acting upon the suggestion contained in the above report, Major Rogers traced the Illecillewaet river to its source in the Illecillewaet glacier and, ascending Mt. Avalanche, gazed upon the little marshy meadows nestling snugly among the patches of spruce trees at the summit of the pass through which the railway was destined to run. The

following year, 1882, he completed his investigation from the east and, travelling up the Beaver river valley, crossed the summit and joined his previous route from the west.

Meanwhile matters were moving apace towards the desired end. The persistent demand for a through road connection with the eastern side of the mountains was largely due to the fact that the Fraser and Columbia river gold diggings were attracting considerable attention, and parties of miners from eastern Canada were frequently braving the hardships and dangers of the mountain passes to reach them.

In 1871, British Columbia joined Confederation. By the terms of union the Canadian Government undertook to secure the commencement, within two years, of a railway from the Pacific ocean towards the Rocky mountains, and from a point east of the Rocky mountains towards the Pacific, having in view a through line of railway to connect the sea-board of British Columbia with the Atlantic, and to complete the same within ten years from the date of Union.

But little time was lost in commencing operations and the same year Sir Sandford Fleming, as Engineer-in-chief of the Canadian Pacific railway, commenced the organization of the exploration and survey parties that were to spread over the country in many directions for the purpose of ascertaining the most feasible route through the several mountain ranges for a grand national highway connecting the Atlantic and Pacific oceans, and incidentally to make known to the world the great fertility and abundant resources of the British North American continent.

The principal problem that presented itself was to find a suitable low level pass through the main Rocky Mountains Range, previous exploration having fairly well established the fact that beyond this obstacle the undertaking was feasible. The earlier exploratory surveys seemed to point to the accomplishment of the object sought by way of Fort Edmonton, Pembina and

McLeod's rivers, the head-waters of the Athabasca river, Jasper valley and head-waters of the Fraser river through the Yellow Head or Leather pass; thence, crossing the Canoe river, to the head-waters of the North Thompson river and down the same to Kamloops. From this point, the route has remained as then selected, viâ the Thompson and Fraser rivers to tide-waters of the Pacific ocean, the alternative routes surveyed from the junction of the Thompson and Clearwater rivers respectively to Howe sound, Bute inlet and Burrard inlet having been ultimately rejected.

For a number of years the main energies of the Government were bent in the direction of the Yellow Head pass, though other routes were surveyed and reported upon. By the year 1880 a line had been located, from among many trial lines, extending from Fort William at the mouth of the Kaministiquia river to Selkirk near the southern end of Lake Winnipeg, and from Selkirk, passing north of Fort Ellice and south of Fort Pelly, through the settlement south and west of the Riding mountains, to Battleford and Edmonton and thence, via the Yellow Head pass and Thompson river to the Pacific Coast. However, at the close of the year 1879 construction had practically not yet been commenced west of the Red river, although about 100 miles of the main line and Winnipeg branch had been placed under contract, and in British Columbia one hundred and twenty-seven miles of the main line.

Although at this time the line had been located as above, it was by no means a settled matter, and events of the same year changed the entire course from the Red river westerly and placed it in the present more southerly location by which the mountains are entered through the Bow river pass and traversed viâ Hector* and Rogers passes, joining the previously located line at Kamloops.

* Now Kicking Horse pass.

Among the explorations and surveys made in 1879, was one by Prof. John Macoun, M.A., a noted authority upon botany, embracing the territory lying between the 102nd and 115th meridians of longitude and the 51st and 53rd parallels of latitude, south of the line of railway, as then located. In his report he writes: 'Between the Red Deer and Bow rivers on the line crossed by us, the land was generally good and that for some distance on both sides of us was said to be of the same character. Taking Bow river as a base line, the country from at least ten miles east of the Blackfoot crossing to twenty miles west of Calgary, is nearly all fit for the plough on both sides of the river. As the mountains are approached, the country becomes broken, and we pass into the very finest pasture land on the continent: sheltered valleys, clear spring brooks, dry exposed hill-tops and excellent grass everywhere seem to be the chief features of the country around Morleyville, and for 40 miles north. All parties agreed in stating that the country south of the river was the same as I saw north of it.' Again: 'In conclusion, all the land embraced within the limits of my exploration, except the said hills at the head of the Qu'Appelle and a strip of dry country north of the "River that turns," a few square miles of sandhills west of the South Saskatchewan at the Elbow, a few more in the Bad Hills and the dry arid region around the Hand Hills, and in the valley of the Red Deer river, in their vicinity is either fit for the plough or first-class pasture. I am quite safe in saying that eighty per cent of the whole country is suited for the raising of grain and cattle, and would not be the least surprised if future explorers formed a much more favourable estimate.' The thorough examination and favourable report made by Professor Macoun, added to the greater facilities offered for railway construction, were probably the two principal factors in leading to the change of route.

From the inception of the explorations and surveys, in 1871, until the year 1880, the undertaking had been carried on by the

Sir William Van Horne

Government under the charge of Sir Sandford Fleming as Chief Engineer. In that year a radical change was made and the enterprise transferred to a private company, very heavily subsidized. The company was promoted by Mr. George Stephen (now Lord Mount-Stephen), Mr. Donald A. Smith (now Lord Strathcona), and others; Mr. W. C. Van Horne (now Sir W. C. Van Horne, K.C.M.G.), an American, was appointed General Manager, and, among others, Major A. B. Rogers, as Engineer in charge of the mountain division. Born at Orleans, Massachusetts, in 1829, he graduated at Yale and studied as a civil and railway engineer. He was engaged upon the Erie canal works, the Chicago, Milwaukee and St. Paul and other American railways, and from 1880 to 1885 was in charge of the mountain division of the Canadian Pacific railway. He had with him, during this time, two nephews, Albert and John Rogers, the former of whom accompanied him on his first trips up the Illecillewaet and Beaver valleys. It is after this one that the Albert canyon of the Illecillewaet valley is named. Major Rogers is known as 'The Railway Pathfinder.'

The decision of the management of the new company to change the location of the line from the route through the Yellow Head pass to a more southerly one, led to a thorough examination of the Bow river and Hector passes, and the valley of the Columbia river. It will be remembered that Mr. Walter Moberly had established the accessibility to a railway of the Eagle pass from the Columbia westward, via Sinuswap lake and the South Thompson river to Kamloops; Major Rogers soon discovered that the Kicking Horse and Columbia river valleys were feasible.

The same difficulty that confronted Mr. Moberly in 1865 and led him to explore the Illecillewaet valley, was now apparent in the approach from the eastward, viz.: the excessive length of construction Around the 'Great Bend' of the Colum-

bia, a distance of over two hundred miles, and the additional time, a matter of the very greatest importance in this age of rapid movement, that would be consumed in travelling by such a circuitous route. In consequence, Major Rogers' first energies were directed to finding a straighter path across the Selkirk range. Acting upon the statement made by Mr. Moberly in the report previously quoted, he followed that gentleman's footsteps to the forks of the Illecillewaet river and then proceeded up the southerly branch, the one Mr. Moberly wished to ascend but could not, owing to his Indians refusing to accompany him, to the present site of Glacier House, where he climbed a mountain and gazed upon the summit of the pass which now bears his name. Major Rogers seems to have been a man of few words, and not much given to poetical effusion. His reports contain little beyond the technicalities of his undertakings; otherwise, a description of the magnificent spectacle displayed by the Rogers pass and its surroundings, seen for the first time by civilized ken, would be well worth the reading. Mr. Albert L. Rogers, who was with his uncle, has, however, very kindly prepared a short article, descriptive of his trip, from notes taken by him at the time. It will be found in the appendix.

The following year, 1882, the exploration was completed by ascending the Beaver river valley to Bear creek, a tributary stream; then up that stream through the rugged defile between Mts. Macdonald and Tupper to the summit of the pass, and over the same to the Illecillewaet valley.

It did not take long to put the results of his explorations into practical execution. At the close of 1881 he left a party at the mouth of the Kicking Horse river with instructions to make such surveys and explorations during the winter as the weather would permit. The next spring, three full engineering parties were placed in the field: one to commence location from the summit of the Rockies eastward, another from the summit west-

Major A. P. Rucker.

ward, and a third to commence exploratory work in the Selkirk range.

In his report of 1883, Major Rogers speaks of sending these three parties to the Rocky mountains by way of Fort Benton (over the St. Paul, Minneapolis and Manitoba railway) and Fort Calgary. Personally he proceeded to the Columbia river viâ San Francisco, Portland, Pend d'Oreille lake and Kootenay river. It will thus be seen that as late as 1882, just twenty years ago, the old travelled routes of the North-West and Hudson's Bay fur trading companies were the only means of entrance to the mountain fastnesses and that up to that date no connection existed between the eastern and western provinces of the Dominion. Even to-day the great highway from the south may be seen, indelibly marked on the face of the prairie, showing in the distance like a black sinuous line on the light grassy background of ridge beyond ridge. In places, as many as twelve or fourteen ruts, made by the endless succession of Red river carts and 'prairie schooners,' used by the early freighters, may be seen side by side, worn deeply in the black alluvial mould; and, like the buffalo paths of bygone days, only to be effaced by the inroads of the plough.

On the 22nd May, 1882, Major Rogers started from the Columbia river camp across the Selkirks, but owing to high water, was unable to pass over the range. He returned by way of the Spillimacheen river, reaching that waterway by ascending Grizzly creek and crossing the divide between. The latter is a confluent of the Beaver river, two miles above Bear creek. He reached the Columbia about fifty miles above the mouth of the Kicking Horse, and so found a very good route for a pack-trail to the Beaver river, near the mouth of Bear creek.

On July 17, he started on a second trip into the Selkirks by way of the Beaver river, taking with him two white men and three Indians, and on the 24th had succeeded in finding a pas-

ticable line across the summit and down the easterly branch of the Illecillewaet. On the 8th August, a party was sent to open a trail up the Beaver valley to the summit and to make a survey from that point easterly. The party succeeded in cutting the trail, but, owing to the tremendous amount and size of the fallen timber and other difficulties encountered, were too late to commence an instrumental survey.

Up to November, 1882, the location of the line had been completed from the summit of the Rockies eastward, a distance of forty miles, and from the summit westward for eight miles, the latter section covering the heaviest part of the work of descending to the Columbia; a preliminary survey had been made for eleven miles beyond, ending in the bottoms of the Kicking Horse river, and, following these bottoms twelve miles further, an additional twenty-seven miles of trial line had been run in the Columbia valley.

On the western slope of the Rocky Mountains range, Major Rogers stated that he could secure a maximum gradient of 90 feet to the mile, but it would involve excessive curvature and a large increase in distance, cost and time of construction, so that, as helping engines would be required in any case, he had adopted a heavier grade and the shortest practicable line with gradients of 116 feet to the mile.*

Owing to the shortness of the season, the difficulties and delays encountered in reaching the work, high water in the streams and the enormous amount of labour involved in cutting trails, no instrumental survey of the line across the Selkirk range had been made. However, the route had been thoroughly examined and the altitudes ascertained by repeated barometric observations, carefully checked, and it might safely be said that

*The grade, however, was subsequently increased to 222 feet to the mile and is in use at the present day. The employment of so steep a grade is understood to be temporary, the solids of the trains being assisted by side switches or spur lines running up the mountain side at a high grade, to which a runaway train can be directed upon a preconcerted signal by the engineer.

a practicable line could be had with maximum gradient of 105 feet per mile. In this case also, it was recommended that the grade of 116 feet per mile be used to avoid points where evidence of dangerous snow-slides existed. Major Rogers closed his report by stating that the altitude of the line at the summit of the Rocky Mountains range did not exceed 5,500 feet, and that of the Selkirks, 4,500 feet above sea-level. By the latest deductions, they are placed respectively at 5,329 and 4,361 feet.

The surveys of the main line between Calgary, at the eastern base of the foothills of the Rockies, to which point they had been carried from the east, and the summit of the main range were completed during the ensuing winter and the following spring. Little more than two years later, daily trains were passing to and fro between Montreal and Port Moody, at that time the Pacific terminus of the railway.

CHEOPS AND NAPOLEON

CHAPTER III.

THROUGH THE RANGE.

BEYOND the facts that the rails had been laid to Calgary, and construction trains were running to that point, matters were in the condition last mentioned when, in August, 1883, Sir Sandford Fleming commenced his famous trip along the route of the railway through the several mountain ranges lying between the prairie region and the Pacific ocean. He had been Chief Engineer of the railway from the commencement of the explanatory surveys in 1871 until 1881, at which time, by a

Photo: Topley, Ottawa.

Sir Sandford Fleming.—Early Photo.

change of policy, its construction had been transferred to a private company; and he was now induced, as an expert, to undertake an examination of and report upon the proposed route through the mountains by way of the Kicking-Horse and Rogers passes. The journey is remarkable in that it was the first continuous one along the actual line of the railway from Lake Superior to the Pacific coast. With him were the late Rev. Dr. G. M. Grant (Principal of Queen's University, Kingston) and his son, Sandford.

A most vividly written and interesting account of the trip is found in Sir Sandford Fleming's book 'England and Canada, a Summer Tour between Old and New Westminster,' published in 1884. As it is the first detailed account of a journey through the mountain passes now followed by the railway, a short sketch of the trip described in this volume, or at least such portion of it as refers to the matter in hand, may be appropriate:

About the middle of August, the party arrived at Calgary, the end of the rails, after a number of vexatious delays, due to the unfinished condition of the road. Here it was expected to obtain information that would decide whether it was possible to cross the Selkirk range to the Columbia, and whether it was a matter of certainty that either the Kicking-Horse or Eagle passes could be followed. Information was difficult to obtain at Calgary. Repeated telegrams to Mr. James Ross, in charge of the construction of the mountain division, at length elicited the information that couriers had returned with letters from Major Rogers at the mouth of the Kicking-Horse river. The journey to Kamloops through the mountains was not held to be impracticable, but undoubtedly marked by difficulties. There was a road which wagons could travel for some distance up the Bow valley; where the road ceased, a rough pack-trail extended as far as the exploring parties had penetrated, to a point about five miles beyond the summit of the Selkirks. From there the

ground was perfectly unbroken and for the remainder of the distance, the journey must be on foot; the walking would occupy about ten or twelve days and about ten packers would be required to carry supplies.

Before starting, arrangements had been made with the Hudson's Bay Company to have supplies forwarded from its post at Kamloops to the Columbia river opposite the Eagle pass,* to be at that point not later than the 10th of September. It was now resolved to attempt to cross the mountains by this route, and a start from Calgary was made on the 23rd August. Wagons were employed as a means of transport over the first and easiest stage of the journey. 'We passed Mt. Cascade, so named from the small stream issuing from its side, said to be at the height of two thousand feet, and with one leap descending to the valley below.'

At a depot called Hillsdale, a short conversation with the resident engineer gave new colour to the undertaking and caused a surprise. He had heard of no one having crossed the Selkirk range. Major Rogers had made several attempts to do so, but had so far only succeeded in reaching the summit, or one of the summits, and had not penetrated entirely through the mountains on a connected line. No one was known to have passed over to Kamloops by this route, not even an Indian, and it was questionable if it were possible to find a route which could be followed. This report caused considerable doubt as to the advisability of proceeding. It was, however, decided to await the meeting with Major Rogers, who was understood to be at the mouth of the Kicking Horse river, before coming to a final decision.

At the summit of the Rocky Mountains range, two gentlemen connected with the engineering staff were met, returning from an expedition to the Selkirk range. 'They spoke of the travel

* Where the town of Revelstoke is now situated.

The Hemlock (*Tsuga Pattoniana*).

as of the roughest description as far as they had gone, and it was as far as it was possible to go. They held that the continuance of the route on which we were bound was impracticable; there was no path or track of any description beyond the point at which they turned back, and nothing to mark the way; in fact, no one had been through to the western slope of the Selkirks.'

The party now arrived at the canyon of the Kicking Horse river and 'moved forward down and up gorges, hundreds of feet deep, amongst rocky masses, where the poor horses had to clamber as best they could amid sharp points and deep crevices, running the constant risk of a broken leg. The trail now takes another character, a series of precipices run sheer up from the boiling current to form a contracted canyon. A path has therefore been traced along the hillside, ascending to the elevation of some seven or eight hundred feet. For a long distance not a vestige of vegetation is to be seen. On the steep acclivity our line of advance is narrow, so narrow that there is scarcely a foothold; nevertheless, we have to follow for some miles this thread of a trail, which seemed to us by no means in excess of the requirements of the chamois and mountain goat. We cross clay, rock and gravel slides at a giddy height. To look down gives one an uncomfortable dizziness, to make the head swim and the view unsteady, even with men of tried nerve. I do not think that I can ever forget this terrible walk; it was the greatest trial I ever experienced. We are from five to eight hundred feet high on a path of from ten to fifteen inches wide and at some parts almost obliterated, with slopes above and below us so steep that a stone would roll into the torrent in the abyss below. There are no trees or branches or twigs which we can grip to aid us in our advance on the narrow and precarious footing.'

Major Rogers stated that he had found the pass through the Selkirk range and that he proposed to accompany the party for-

part of the distance and to send his nephew, Mr. Albert Rogers, the entire route. It was necessary to follow the Columbia river for thirty-two miles northwesterly to the valley of the Beaver river, up which the ascent was made to the opening through the range, known as Rogers pass. A pack-trail for horses had been opened for a little distance past the summit; 'beyond that point was the wilderness in its natural ruggedness, without a path for human foot, with the river and mountain gorges only as landmarks and guides.'

The party travelled down the Columbia by canoes, the pack-train going by trail. Passing Blaeberry river, the entrance to the Columbia valley by the Howse pass route, then Wait-a-bit and Bluewater creeks, they eventually arrived at the mouth of a canyon, where the bed of the river is contracted between rocky bluffs. From this point the march was made on foot along the north bank to a point opposite the mouth of the Beaver river. The horses were crossed by swimming, the stream here being about 400 yards wide, and the outfit ferried over by means of an old leaky boat used by the Moberly surveying party in 1871. The rough and recently cut trail was now followed up the Beaver valley, which is about half a mile wide. 'There is a dense growth of cedar, spruce and cottonwood; and such magnificent cedar! Four feet and more in diameter. We have now an undergrowth which is the genuine flora of the Pacific slopes. Everywhere the prickly aralia, or devil's club, and ferns and skunk cabbage, all of the rankest growth, on the low ground.' But no pasture could be found for the horses.

The Beaver river was followed for fifteen miles and Bear creek ascended to the summit, much inconvenience being experienced on account of the forest fires burning in the valley and on the slopes. Bear creek was so named on account of the large number of these animals frequenting its vicinity and that of the Beaver valley. The surveying party locating the line of railway

had seen as many as fifty.* 'On the southern side of the mountains, as we wend our way, great scaurs banked with snow are seen, two hundred or three hundred feet above the bottom of the narrow valley through which Bear creek flows. . . . . Five miles from our last night's camp we leave Bear creek and follow a small stream to the south. Half a mile further brings us to the summit. At last there is a pasture for the poor horses, so they are unloaded and unsaddled and turned out to their food.'

Arrived at the summit, Major Rogers is congratulated upon the discovery of a pass so far practicable, and 'on certain conditions appearing to permit a solution of the problem of crossing over the Selkirk range instead of making a détour, following the Columbia by the Boat Encampment. We are now 4,600 feet above the sea, surrounded by mountains of all forms, pyramidal, conical and serrated. They are marked in bold relief on the lofty sky-line. Between, their everlasting glaciers present the most remarkable variety of appearance. Westward, there is an open valley with great peaks, which stand out in the dim distance. It is by looking north, in the direction whence we have come, that we have the grandest view. The valley is to all appearance completely inclosed by what seemed to be impenetrable mountains. The defile which we entered is not visible, although the entrance is dimly seen, clothed in shadow, through the smoky air. Towering high near the crest, there is a series of glaciers extending for half a mile or more from north to south.'

Major Rogers here stated that he was indebted to the report of Mr. Walter Moberly, presented to the British Columbia

* It may be added to the notes of Sir Sandford Fleming, that the extremely prolific growth of berries along the slopes on both sides of the Beaver river and Bear creek, and the abundance of skunk cabbage, on the roots of which plant bears are said to have a great liking, would probably account for the large number that even at the present day make their haunts at the head of the creek and roam in its vicinity.

Government in 1865, for a suggestion that led to his examination of the Rogers pass. As far as he knew, Mr. Moberly was the first white man to ascend the Illecillewaet river.* 'It was upon this hint Major Rogers acted. Two years back (1881), he traced the Illecillewaet to the forks and followed the eastern branch.† This branch also proceeded from two streams, the most southerly of which he followed.‡ With his nephew, he climbed a mountain§ on its northern bank, and from the summit he looked down upon the meadow upon which we were then resting. Major Rogers, pointing up to the height directly in front of us, said: "There Al and I stood; we could trace through the mountains a valley, and the conclusion was established in my mind that it led to the unexplored branch of the Illecillewaet. We also traced a depression to the east, which we considered might lead to the upper waters of the Columbia, and so it proved." Major Rogers could go no farther at that date. He was short of provisions and he returned as he came: but the next year he ascended the stream by which we had travelled for the last two days, and reached this grassy plot.' He then followed the stream flowing from the summit to its junction with the Illecillewaet, connecting with the journey of the previous year from the Columbia eastward; thus being the first white man to travel the entire distance across the Selkirks by this route. He returned by another road, in the hope of finding a better pass, but did not succeed.

'A party has been detailed to cut a trail westward which we are now to follow as far as it is made possible. Beyond that point our party will be the first to pass across the Selkirk range

*The above report has previously been referred to.

† Mr. Moberly ascended the one flowing from the north.

‡ It was the stream flowing from the summit of the pass that Major Rogers followed. The other comes from the Illecillewaet glacier. See Albert Rogers' account of this trip, in the appendix.

§ Undoubtedly Mt. Avalanche, as it is the only peak visible in this direction from the summit of the pass.

from its eastern base on the Upper Columbia to the second crossing of that river. . . . The summit on which we stand is a dry meadow about a mile in extent, with excellent grass. On the approaches we found raspberries, blackberries, blueberries, pigeon-berries and gooseberries.'

The descent from the summit to the Illecillewaet now commenced. They descended slowly, crossing a series of avalanche slides covered by a growth of tall alder bushes, along a line cut through by the survey party. 'We continued through the valley, walled in by mountains, the height of which must be counted by thousands of feet. After a progress of fourteen miles, we come upon two large masses of frozen snow,* one on each side of the river and fifty feet back from it. We learn that three years ago, when first seen, they were much larger and higher, forming a great natural bridge across the stream. The water, which is here of considerable volume and impetuosity, flowed through the opening which it had forced in the centre. It is the remains of an avalanche from one of the glaciers, at what date no one can tell, and, as I have said, it was first seen three years ago. The bridge has disappeared and only the abutments of hard frozen snow or ice are left, and they are gradually melting away. Mr. Moberly mentions in his journal, 26th September, 1865, having seen, further up the Illecillewaet, a snow bridge, on which his party crossed the stream, which flowed two hundred and fifty feet beneath without being seen'. The party now reached a surveyor's camp in charge of Mr. McMillan, twenty four miles from the summit.† There was no trail cut beyond this point and as the future packing would be done on men's shoulders, the horses were sent back.

Here good-by was said to Major Rogers and Mr. McMillan. 'In saying good-by to them, we were bidding farewell to all civilization which had forced itself into the mountains. Our

* This must have been in the vicinity of Laurie running camp.

† Probably at or near Albert Canyon village.

world was for a time in our little band. We knew nothing of the country before us and we had no assistance to look for from the world behind us. We were following a tributary of the Columbia to the waters of that river, and this was the only guide for our direction. One by one we march off in Indian file to the forest, and I bring up the rear. Independently of myself, the party consists of Dr. Grant, my son Sandford, Mr. Albert Rogers, and five men from Mr. McMillan's party, transferred to my service to carry our necessary stores as far as the Columbia river. . . . The walking is dreadful, we climb over and creep under fallen trees of good size, and the men show that they feel the weight of their burdens. Their halts for rest are frequent. It is hot work for us all. The dropping rain from the bush and branches saturates us from above. Tall ferns, sometimes reaching to the shoulder, and devil's club, through which we had to climb our way, make us feel as if dragged through a horsepond, and our perspiration is that of a Turkish bath. We meet with obstacles of every description. The devil's club may be numbered by millions and they are perpetually wounding us with their spikes, against which we strike. We halt very frequently for rest.

'Our advance is varied by ascending rocky slopes and slippery mosses and again descending to a lower level. We wade through alder swamps and tread down skunk cabbage and prickly aralias, and so continue until half-past four, when the tired-out men are unable to go further. A halt becomes necessary. We camp for the night on a high bank overlooking the Illecillewaet.' The possibility of constructing a raft to float down the Illecillewaet was now discussed, but the idea was abandoned. 'As we look upon the water foaming past us and the numerous rocks and obstacles in the stream, we are satisfied that no raft could live long in such a torrent.'

The previous day's advance in a direct line was estimated at four miles and the principal business at halting places had

been the extracting the prickles of the devil's club from their hands and knees. At noon the next day they stopped at the 'junction of two clear streams from the mountains, the more bright and crystal-like from contrast with the chocolate looking waters of the Illecillewaet.'*

Rain! Rain! Rain! 'The rain continues falling incessantly. Although Sunday, owing to limited supplies, we are compelled to travel. The walking is wretchedly bad, we make little headway, and every tree, every leaf is wet and casts off the rain. In a short time we are as drenched as the foliage. We have many fallen trees to climb over and it is no slight matter to struggle over trees ten feet and upwards in diameter. We have rocks to ascend and descend; we have a marsh to cross in which we sink often to the middle. For half a mile we have waded, I will not say picked, our way to the opposite side through a channel filled with stagnant water, having an odour long to be remembered. Skunk cabbage is here indigenous and is found in acres of stinking perfection. We clamber to the higher ground, hoping to find an easier advance, and we come upon the trail of a caribou, but it leads to the mountains. We try another course, only to become entangled in a windfall of prostrate trees. The rain continues falling incessantly: the men, with heavy loads on their backs, made heavier by the water which has soaked into them, become completely disheartened, and at half-past two o'clock we decide to camp. Our travelling to-day extended only over three hours. We have not advanced above a mile and a half of actual distance and we all suffer greatly from fatigue. I question if our three days' march has carried us further than ten miles.' †

On Monday, an attempt was made to systemize the travelling and the rule was laid down to walk twenty minutes and rest

* Probably the twin creeks near Twin Butte siding.

† The above vivid description will doubtless appeal to all who have travelled through the Selkirk valleys without a trail.

five. 'Dr. Grant was appointed quartermaster-general with absolute authority to time halts and marches by the sound of a whistle.' That night's camp was pitched on a small plateau of about half an acre overlooking the river, 'which passes in a foaming torrent through a deep canyon, with perpendicular rocky sides, which twists in gigantic irregularities; such places are seen only in these mountains. The packmen gave them the name of "box canyons."'

Tuesday morning, 'we start off cheerfully, but are not out of the canyon. We again climb through the rocky defile and about half a mile from our starting point we reach a jam of trunks of trees, not far from its lower end.* Tree after tree has been piled here by the current for many a year. Who can tell the period? For the space of some hundreds of yards, up and down the stream, a mass has been heaped up, thirty or forty feet above the level of the water. There is an accumulation of material in that spot which would be a fortune to its possessor if he had it in London or any European city.'

At lunch that day two rifle shots were fired. A gun-shot replied. Again three shots were fired and three shots answered. 'Thank God! we have established our connection. Our friends are in front of us with the provisions on which we rely. All anxiety for the future is past, and the promised waters of the Columbia cannot be far from us.'

They press forward, and at the first rest fire another shot, to which two shots reply more distinctly than at first. 'Soon we are out of the green woods and are in sight of the Columbia. We observe the smoke of a camp a mile from us on the opposite shore. Impulsively we give a series of hurrahs, for it seems to us we can see our friends from Kamloops. Two canoes cross

* This jam, or a similar one, now exists. It is about two miles from Revelstoke and was used during the past summer in making our ascent of Mt. MacDonald. It is not now nearly so large as described by Sir Sandford Fleming.

the river. We are standing upon the high sandy bank in full view of the Eagle pass.'

These eager hopes were doomed to disappointment. The canoes contained only Indians. They spoke no English, but by the help of a little Chinook it was learned that the expected party from Kamloops had not arrived. 'It was the Indians who had replied to our shots.' They were a hunting party from Fort Colville.

The packers were now sent back and the river crossed by the remaining members of the party. 'The Columbia at the junction of the Illecillewaet is a noble stream, broad and deep. The width about 1,200 feet.'

Doubt and uncertainty now reigned supreme. 'In this painful embarrassment, and it was painful, we asked ourselves the question: Would it be prudent to go on, risking the chance of meeting the party from Kamloops, or do circumstances compel us to give up the idea of crossing the Gold range and force us to enlist the services of the Indians to take us down the Columbia, some two hundred miles to their own village, from which point we can find our way to Portland, in Oregon, in twelve days, and then by Puget Sound reach our destination in British Columbia? . . . We are no longer in the wet and clammy recesses which we passed through along the course of the turbulent river recently followed. We are on the banks of a noble stream, in the wide open valley of the Columbia. The landscape which met our view was of great beauty. It was mellowed with autumnal tints and confined with countless peaks. To the east lay the valley of the Illecillewaet, surrounded by towering heights, gradually fading in the distance, while in front of us the Columbia swept along through its various windings, made more glittering by the contrast of the dark masses of foliage in the low ground. Evening came on to throw a more sombre tint of colour over the scene. All that was heard was the peculiar sound of the rapidly flowing stream and the distant roar of the Illecillewaet.'

While still undecided as to the best course to take, five men from Kamloops appeared on the scene. They had brought no provisions. Their stores were cached at a place five days distant and they had barely enough to supply their own wants. One of the Colville Indians was engaged to act as guide and a start made for Kamloops through the Eagle pass. The remainder of the journey was accomplished satisfactorily and at length the much wished-for goal was reached. From Kamloops to the coast the journey lay along a well-travelled route, and more modern methods made it an easy and comfortable one.

Between the date at which the Crown Colony of British Columbia joined Confederation, 1871, and Sir Sandford Fleming's journey in 1883, a large number of exploration parties passed from the east across the mountains, drawn by the interest centring in the new colony and the abundant information concerning these heretofore little known regions that was being made public by the explorations and surveys of the Canadian Pacific railway. They had crossed chiefly by the old travelled routes of the fur trading companies, or by some one of the passes reported upon by Capt. Palliser's expedition. Subsequently, however, to 1883, journeys by the line mapped out for the railway became frequent, both from the east and from the west, for various purposes connected with that undertaking and with the province of British Columbia. Much headway having been made during the fall of 1883 and spring of 1884, and trails cut out and made passable for horses over the entire distance, the difficulties of travel had been considerably reduced and consequently the interest attaching to such journeys greatly diminished as compared with the one above described.

Sir Sandford Fleming, in his most interesting and well written paper, prepared for the Royal Society of Canada, entitled 'Expeditions to the Pacific, with a brief reference to the voyages of discovery in seas contiguous to Canada, in connection with a western passage from Europe to Asia,' and

published in the Proceedings and Transactions of that Society, Vol. VII., Section II., 1889, refers in order to all of these expeditions worthy of note. In a concise and masterly manner he leads up to the last great act of the drama, the climax of the hopes, the aspirations and ultimate goal of many years of toil, privation and earnest endeavour, backed by scientific knowledge and skill of the highest order. I cannot do better than repeat, in the words of one of the chief actors, his account of the driving of the last spike and the passage of the first through train over the Canadian Pacific railway in 1885.

'On the evening of October 27th, when the regular Winnipeg train left Montreal, a private car, the "Saskatchewan", was attached, with the design of proceeding to Port Moody, at that date the terminus, the new city of Vancouver having no existence. The car contained seven persons: five came the whole way from Montreal, one of them joined at Ottawa, and one on their way to Port Moody. . . . The train beyond Calgary became a "special" and reached the western crossing of the Columbia in 56 hours after leaving Winnipeg. The gap, however was not closed; the work having been retarded by incessant rains, so the train could not proceed further. Early on the morning of the 7th, the junction was verging to completion, and at 9 o'clock the last rail was laid in its place. All that remained to finish the work was to drive home one spike.

'By common consent, the duty of performing the task was assigned to one of the four Directors present, the senior in years and influence, whose high character placed him in prominence—Sir Donald Alexander Smith. No one could on such an occasion more worthily represent the company or more appropriately give the finishing blows, which, in a national sense, were to complete the gigantic undertaking. (The other Directors present were Messrs. Van Horne, Harris and the writer.)

'Sir Donald Smith braced himself to the task, and he wielded the by no means light spike hammer with as good a will

as a professional tracklayer. The work was carried on in silence. Nothing was heard but the reverberation of the blows struck by him. It was no ordinary occasion, the scene was in every respect noteworthy, from the group which composed it and the circumstances which had brought together so many human beings in this spot in the heart of the mountain, until recently an untracked solitude. Most of the engineers, with hundreds of workmen of all nationalities, who had been engaged in the mountains, were present. Everyone appeared to be deeply impressed by what was taking place. The central figure in the group was somewhat more than the representative of the railway company which had achieved the triumph he was consummating. His presence recalled memories of the Mackenzies and McTavishes, the Stuarts and McGillivrays, the Frasers, Finlaysons, McLeods and McLaughlins and their contemporaries, who first penetrated the surrounding territory. From his youth he had been connected with the company which for so long had carried on its operations successfully from Labrador to the Pacific, and from California to Alaska. To-day he was the chief representative of that vast organization which, before the close of the last century, had sent out pioneers to map out and occupy the unknown wilderness and which, as a trading association, is in the third century of its existence. All present were more or less affected by a formality which was the crowning effort of years of labour, intermingled with doubts and fears and oft renewed energy to overcome what at times appeared unsurmountable obstacles. Moreover, was it not the triumphal termination of numberless failures, the successful solution of the frequently repeated attempts of the British people, ever since America had been discovered, to find a new route to Asia? To what extent the thoughts of those present were turned to the past must, with that undemonstrative group, remain a secret with each individual person. This much may be said: to all, the scene was deeply impressive, and especially to the many hundreds of

workmen, who, from an early hour up to the last moment, had struggled to do their part, and who were now mute lookers-on at the single individual actively engaged—at one who in his own person united the past with the present, the most prominent member of the ancient company of "Adventurers of England," as he was the representative of the great Canadian Pacific Railway Company.

'The blows on the spike were repeated until it was driven home. The silence, however, continued unbroken, and it must be said that a more solemn ceremony has been witnessed with less solemnity. It seemed as if the act now performed had worked a spell on all present. Each one appeared absorbed in his own reflections. The abstraction of mind, or silent emotion, or whatever it might be, was, however, of short duration. Suddenly a cheer spontaneously burst forth, and it was no ordinary cheer. The subdued enthusiasm, the pent-up feelings of men familiar with hard work, now found vent. Cheer upon cheer followed, as if it was difficult to satisfy the spirit which had been aroused. Such a scene is conceivable on the field of hard-fought battle at the moment when victory is assured.

'Not unfrequently some matter of fact remark forms the termination of the display of great emotion. As the shouts subsided, and the exchange of congratulations were being given, a voice was heard, in the most prosaic tones, as of constant daily occurrence: "All aboard for the Pacific." The notice was quickly acted upon and in a few minutes the train was in motion. It passed over the newly laid rail and amid renewed cheers sped on its way westward.

'On the same night a telegram was sent to Ottawa and published in the eastern Canadian newspapers. It ran: "The first train from Montreal is approaching Yale, within a few hours of the Pacific coast. The last spike was driven this morning by Hon. Donald A. Smith at Craigellachie, in Eagle pass, some 340 miles from Port Moody. On reaching the coast our run-

ning time from Montreal, exclusive of stoppages, will be five days, averaging twenty-four miles per hour. Before long passenger trains may run over the railway from Montreal to Vancouver in four days, and it will be quite possible to travel on special occasions from Liverpool to the Pacific coast by the Canadian transcontinental line in ten days. All are greatly pleased with the work done. It is impossible to fully realize that enormous physical and other difficulties have been overcome with such marvellous rapidity and with results so satisfactory." The train arrived at Port Moody the following morning, November 8th. On the succeeding morning the principal newspapers in England published the substance of the above telegram, with the additional important fact that the first through train from Montreal had actually arrived at the coast.'

The driving of the last spike at Craigellachie on the 7th November, 1885, opened up not only the glorious scenery and invigorating atmosphere of Canada's mountain belt to the whole world, but also its immense resources in minerals and timber, and the many industries and enterprises dependent upon them, to the capitalist. Soon after construction had been completed, European and other travel began to set to and fro by means of the transcontinental highway. The fame of the Rockies and Selkirks went forth to the world and they have become the playground of those whose leisure hours permit of such recreation. Others, to whom time is a limited commodity, content themselves with spending a day or two, *en route*, at the favourite resorts, or simply with passing through and seeing all that is possible of the glorious mountain scenery and the wonders of the road during transit.

In order to provide meals for their passengers and, at the same time, not to make their trains heavier by hauling extra cars over the steeper portions of the line, the company found it necessary to erect dining halls at various points through the mountain section; these, gradually, owing to the public demand,

became stopping places and continued the process of evolution until the magnificent hotel at Banff and commodious stopping places at Laggan, Field, Glacier and North Bend became the products of the present day, and are even now found all too small for the crowds that tax them to their uttermost during the summer months.

Nor is the monopoly in this respect confined only to the main line of the Canadian Pacific railway, for recently has been formed 'The Tourists' Association of Kootenay,' with headquarters at Nelson, B.C., situated at the extremity of the west arm of the beautiful and picturesque Kootenay lake. The object of the association, to quote their own phraseology, is 'to furnish reliable information to tourists concerning the splendid fishing, shooting, boating, mountain-climbing, etc., or any other sports or business in which they are interested; to furnish guides, hunters and boats; to advise as to the best routes of travel; and advertise in every possible way the healthy climate, scenic splendour, beautiful lakes, hot springs, etc., of the district.' It is stated that information relative to these matters may be obtained by addressing the secretary.

The following extracts from an account of a trip over the Canadian Pacific railway, entitled 'By Track and Trail, a Journey through Canada,' by Edward Roper, F.R.G.S., published by W. H. Allen & Co., London and Calcutta, in 1891, will serve as a fair sample of the impressions and entertainment that may be derived from the Selkirk portion of such a journey:—

'After leaving Golden we ran on again beside the river, and it was somewhere here that we got our first view of the Selkirks, the next mountain range we had to cross. From dark, almost black, pine covered foothills the Selkirks rose: a glorious mass of pinnacled, serrated mountains, to my mind far more beautiful than anything we had yet seen in the Rockies. The forest climbs much higher up their sides, which are scored and seamed with avalanche slides, and their peaks covered with eternal

snow. The sky behind them was deep azure when we first saw them, their peaks sharp cut against the blue, while their bases seemed to float in a transparent golden mist. . . . We then began to ascend the Beaver river canyon, which would ultimately lead us to Rogers pass, by which we were to get through the Selkirks and so cut across the Big Bend of the Columbia. It was evident now that we were ascending a stiff grade. Beside us the Beaver river was roaring and rushing over its boulder-strewn course. . . . From the window we could see that we were still passing through a grandly wild country. The moonlight flashed on snow peaks and on torrent, the noise of some waterfalls we passed quite deadening that of the train. Somewhere about here we passed through the first snow-shed, then came a tunnel cut in snow, then high banks of it piled beside the track, so close, their two sides seemed to be a few inches from the window. . . . . Now we were traversing deep canyons by terrible trestle-bridges, the bottoms of which could not be seen, and ever and anon a rushing stream would dive under the line. We passed more mountains of ice and snow, and then we stopped. We were at Bear Creek station, close to Mt. Carroll (now Mt. Macdonald), heading for the Hermit range, they told us. . . . Shortly after leaving Bear Creek, we had a long wait, whilst a road was being cleared through the remains of an avalanche, which had just come down. Then, by and by, we crept slowly on again to Rogers pass, the summit of the Selkirks, 4,300 feet altitude. Summit in railway parlance means the highest point attained by the line in crossing a mountain, having no reference at all to the height of the actual mountain top. Here we had a long delay. The conductor told us they had just heard, by wire, of course, that there was an immense quantity of snow down immediately beyond the Loop. Presently he came again and said: "The train will not get through this night". . . . Later, the conductor came into the car and announced in a loud, cheery voice, "By the

Glacier House, B.C.

company's orders and at their expense, all 'sleepers' are to take up their quarters at Glacier House till the road is clear. Glacier House is next stoppage." Then the bell began to clang, echoing grandly among the ice-bound hills around us. The train crept on and on, through a very long snow-shed, across a roaring torrent, then drew up at Glacier House. . . . The manager appeared, to let us in. He took charge of us, recognized that we were human and did his best for us. He was an Englishman, had been chief steward on one of the Allan ships, and knew how to make himself agreeable. . . . We had capital rooms allotted to us, and it was a treat to lie down in a proper bed again and know that all civilized necessities were ready for us in the morning. . . . "Hot water and a tub!" was the announcement that aroused me at eight next morning. I jumped up and from my window beheld a glorious view. Right down below, a deep sweep of pine-clad, unburnt valley; farther away, across miles of primeval forest, with just mist enough hanging about it to give it distance, there rose on high a range of lofty mountains, pink in the morning light. To the right, they were almost covered with pure snow; to the left, sharp, bare peaks cleft the sky—all beautiful, sublime. . . . We were informed that the glacier is only a mile distant, and that there are three hundred square miles of ice one thousand feet thick in it! Surely, that must be enough to cool the country for many miles around. But it struck us then, and I am sure of it now, that they knew very little about it.

'The station proper was just a little wooden office close to the hotel where the C.P.R. agent, telegraph operator, postmaster and express agent did business. A single one-armed man carried all this weight of work on his shoulders, and, as a rule, it was not very much he had to do. We interviewed him shortly after breakfast. He told us that the lines were down and that he had no more knowledge than we had about trains. There might be one at any moment and there might not be one

for days. He added that we had better not go far away, for if a train did come, it could only stay a few minutes. The last message he had from headquarters came about midnight, telling him we were to stop there till further orders. Before that, he had been told that there was a great snow-slide a few miles west and that there was no traffic in that direction; that a bridge was down upon the Bow, and so no train could come from the east; that there was fire in the Rockies and the line would go, since which it had gone, and that is all he could tell us. . . . . Indeed, the whole day was passed delightfully in watching the changes that came over the novel scene. The sky at midday was cloudless, a deep, intense blue, and though the sun was hot, in the shade it was cool enough, the air being fresh and bracing. Across the valley, sombre in the gloom of the pines, trailed, in many a bend, the rapid glacier stream. Beyond it, in unapproachable grandeur, lay the Hermit range, with its outlying spurs heavily timbered, slashed with stupendous canyons lying deep in purple gloom. . . . At evening the hills and mountains, which had been gray all day, blushed rosy pink, which deepened into rose, and then to crimson, while all things solid in the distance seemed to melt away into a dark rich blue, until a strange atmospheric effect blended all into an enthralling picture, when the upper peaks, ice-needles, turned to points of fire and burned against the sky; and, under all, the sombre pines were thrown sharply into black relief against the mystic background. How "small" an artist feels before a sight like this! and then, when all was wan and pale as death, the stars came out, and by and by the moon silvered the same snow-peaks, and there was another picture. Surely, we were in dreamland! . . . After leaving Glacier House, we entered at once on the scene of the engineering feat which is celebrated from end to end of the C.P.R. and through Canada. The line descends 600 feet and so gets down the pass by a series of double loops, some six miles in all, accomplishing, however, barely two miles of distance.

Mount Sir Donald and the Illecillewaet Glacier, from Glacier crest

'There are four or more parallel lines of railway, running closely to each other generally, but each at a different level. The line is carried largely upon trestle-work, crossing and re-crossing the river, which runs down the canyon, and finally resumes it proper course along the Illecillewaet (Indian name for "Swift Current"). It is a very deep, tortuous valley that this rapid torrent of green glacier water thunders through. Tunnels and snow-sheds along its course are numerous and trestle-bridges very frequent. I think we must have crossed the stream from bank to bank a dozen times at least, and often on a timber bridge 150 feet above it.

'Looking back to the heights from whence we had come, the cluster of mountains, of which Mt. Sir Donald is the chief, showed as a magnificent sight. Clouds were hanging about their bases, and their peaks were sharply defined against the deep blue sky. . . . The gorge through which the Illecillewaet river runs is wide in some places, and there it is filled with a forest of grand cedars, firs and pines. Here we saw the Douglas pine for which British Columbia is so famous. Near the station at Illecillewaet, where is a water-tank and telegraph office, there is a silver mine at work, but whether it pays or not we could not hear. Albert canyon was perhaps the most striking of many we passed, with its cataract falling from at least two hundred feet above to hundreds of feet below the track, which runs close in front of it on trestle-work. Soon we came to a more level country, seeing, above the burnt forest, Mount Begbie and Twin Butte towering on high. Then we stopped at Revelstoke, close to where this strangely named river we had travelled down joins the Columbia, the banks of which we were now on again; and so we had crossed the Selkirks.'

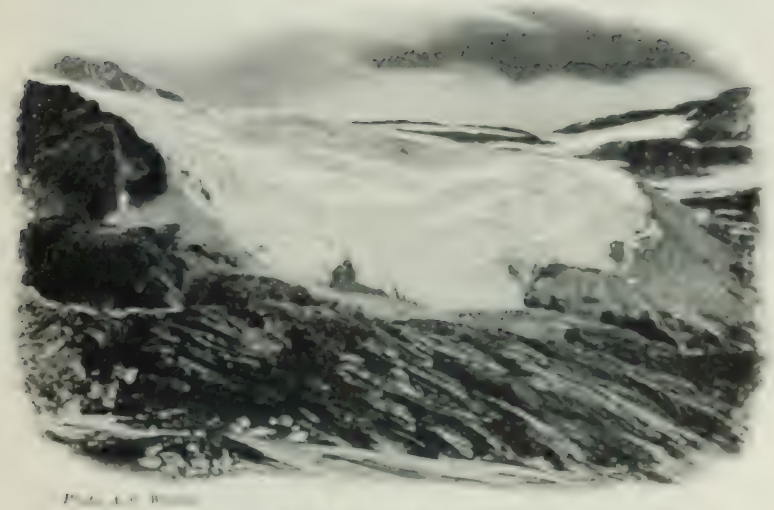
The trip of which the foregoing is a sketch was made in 1890. Since then the track has been placed in a much more finished and safer condition. Snow sheds have been built at all likely spots where an avalanche may threaten, and high wooden

trestles filled in or replaced by steel and stone structures. All possible contingencies have been so guarded against that delays similar to the one above described are of most exceptional occurrence and, even when some such unforeseen mishap does take place, the organization is so perfect that it is but a few hours before hundreds of workmen are on the spot, and seldom is more time lost over a broken bridge, a washout or a snow-slide than can easily be made up over other portions of the road.

The above sketch indicates clearly the pleasure and novelty that may be experienced by a trip through these mountain regions; and while it is not given to every one to express so artistically the impressions derived, yet that fact need in no way impair the sense of enjoyment. By stopping over between trains at Glacier, a visit may be made to the Illecillewaet glacier, a climb to Marion lake and Observation point, even to Mt. Abbott, with perhaps a run up to the summer-house above the Cascade, thereby obtaining, in some degree, a knowledge of the Selkirk summits and enabling the mind to bear away a lasting representation of scenes that are unique and have no parallel throughout the world.

PART III.

PREVIOUS SURVEYS



THE ROGERS GLACIER.

CHAPTER I.

BEFORE THE COMPLETION OF THE RAILWAY.

THE first surveys made in the vicinity of the Selkirks were by David Thompson, Geographer and Astronomer to the North West and Hudson's Bay Fur Trading Companies.

In 1807 he records having built 'Fort Kootenaie,' near the source of the Columbia river, and spending the following winter at that point. His journal and field notes show that, during his residence, he took frequent astronomical observations for latitude and longitude, as was his custom, and further ascertained

the height of many of the surrounding peaks by angular measurements, referring the same to the surface of the Columbia lake.

In 1808 he made a track survey of the Kootenay river (McGillivray's river on his map), using the compass for direction and rate of travel for distance, checked by numerous astronomical observations. The observations were taken with a sextant, and among his papers is found reference to a large brass one of Dollond's* of ten-inch radius, reading to fifteen seconds, which he used constantly.

He seems to have been a man of immense capacity for work and although carrying on the business of agent and explorer, opening up new channels for trade, and continually gathering furs, he found time to make surveys of the routes he followed. His map, made in 1812-14, a copy of a portion of which is here presented, is a general compilation of results obtained. An examination of it and comparison with our modern maps will show that even though crude and unreliable in detail, such a piece of work could only have been compiled from a long-continued and careful system of surveys.

On it the Selkirk range is shown as 'Nelson's Mountains.' Being the first explorer to make anything pertaining to the nature of a survey of that range, it is assumed that he conferred the name upon it. Arrowsmith's oldest map (1795) shows only one long range of mountains under the title of 'Rocky Mountains.' On Palliser's map (1860), as also on Arrowsmith's later map (1863), the name 'Selkirk Mountains' appears, but Palliser makes no reference to the change. On Tratch's map (1870) the 'Selkirk range' is also shown. At the time of David Thompson's first visit to the Columbia lakes in 1807, he was in the employ of the North-West Company. That company and the Hudson's Bay Company amalgamated in the year 1821

* A manufacturer of mathematical and surveying instruments in London, England.

under the title of the latter. The combination meant renewed energy and a vigorous expansion of their trade policy in the regions of New Caledonia beyond the mountains. It is likely that soon after this date the name was changed to 'Selkirk' in honour of Lord Selkirk, the founder of the Selkirk colony on the Red river, and one of the most enterprising patrons of the Hudson's Bay Company.

During his many journeyings to and fro, David Thompson made the complete circuit of the Selkirk mountains, descending the Kootenay river from its entrance into the Columbia valley and again ascending the Columbia river by way of the Arrow lakes, the former in 1808, and the latter in 1811. On both routes he carried out his usual programme of survey and observations. His surveys were also extended into the interior to Flathow or Kootenay lake and along the Chocoos river (the Grand Quête river of Sir George Simpson, and the Moyie of to-day.)

The work of the Imperial Commission in charge of Capt. Palliser, 1857 to 1860, casts little light on the Selkirks, and, beyond elaborating in detail, did little more than go over a portion of the routes in their vicinity, previously surveyed by David Thompson.

By the 'Oregon Treaty' of June the 15th, 1846, it was agreed that the international boundary west of the Rocky mountains should follow the 49th parallel as far as the centre of the strait separating Vancouver Island from the mainland. In 1858, Captain Hawkins, R.E., and Archibald Campbell were appointed Commissioners on behalf of Great Britain and the United States respectively, to survey and mark out this boundary. The field operations of the Commissioners began in the same year and were concluded in 1862. The manner of surveying the line was identical with that afterwards followed on the survey of the prairie section of the 49th parallel; that is, the 49th parallel was determined by astronomical observations at

certain stations, and these were then connected (where the nature of the country permitted) by survey lines, from which the intermediate monuments were placed by computed offsets upon the 49th parallel.

There were 32 astronomical stations and 161 monuments in all. The line across the peninsula of Point Roberts, and from Boundary bay to the Whatcom and Hope trail east of Sumass, was marked by iron pillars at an average distance apart of about three-quarters of a mile. East of this point the monuments consisted of pyramids of stones (in one case of an earth mound). From the Similkameen river to the Columbia river, the line was surveyed continuously, and marks placed at somewhat greater distances than the western section above referred to. This part of the line was also surveyed as a 'mean parallel,' that is, the closing errors of the astronomical stations, due to 'station error,' or local deviation of the plumb-line, were averaged up and the final line run as a continuous curve having the theoretical curvature of the 49th parallel, and a true east and west direction. Elsewhere along the line, except on the two sections referred to, the line was not surveyed between the astronomical stations; the stations were placed in more accessible spots, valleys of rivers, etc., and short pieces of line were run east and west from them, and the successive stations were connected by traverse merely, or some such method.

As to the accuracy of the work, there is very little data at hand from which to estimate it. Station 'errors' up to 200 feet were found on those parts of the line where the astronomical stations were connected by line survey. As those parts lie in the less mountainous country, it is expected that very large discrepancies will be found when the stations in the mountainous regions of the Cascade range or the Rocky mountains are connected.*

* For the above information I am indebted to the kindness of Mr. W. F. King, Boundary Commissioner to the Dominion of Canada.

Mr. Walter Moberly, C.E.

Mr. Walter Moberly's exploration up the Illecillewaet river in 1865 can scarcely be designated as a survey, the object being merely to ascertain the *shortest* feasible route for a low-level road to connect the waters of the Pacific with Palliser's Vermillion pass through the Rocky mountains. He had already established the possibility of such a route by following the Columbia river around the Big Bend. It is likely he kept some sort of record of the differences of level and made a sketch map to illustrate his report of the exploration, but they cannot have been of a very accurate nature, for he speaks of having travelled up the northerly bank of the Illecillewaet river, a distance of forty miles to the forks, and then up the northerly fork thirty miles farther, both of which distances are excessive, an estimation not to be wondered at in the difficult, almost impassable country he travelled for the first time.

Shortly after the organization of the Canadian Pacific railway survey parties in 1871, we again find Mr. Walter Moberly in the Columbia valley. He had been instructed to complete the surveys between Great Shuswap lake and the vicinity of Fort Edmonton, on the North Saskatchewan river, viâ the Howse and Eagle passes. These surveys were a part of the general scheme of exploration, organized to ascertain the cheapest and best route through the several mountain ranges to the Pacific Coast. Mr. Moberly had charge of two parties, designated respectively 'S' and 'T.' Party 'S' was at work on the east side of the Selkirk range, and party 'T' on the west side. Both spent the winter of 1871-72 in camp on the ground, the former at a point some miles south of the confluence of the Columbia and Blaeberry rivers, and the latter at the 'Big Eddy,' close to the mouth of the Eagle pass. The camp near the Blaeberry river, which stream is followed to reach the Howse pass through the main range of the Rockies, formed Mr. Moberly's headquarters. It was situated nearly half-way between Golden and Donald, and at the present day, a flag

station of the railway, named 'Moberly' is located close by. A very prominent peak in the vicinity is also called 'Moberly peak' in honour of the pioneer of the Eagle pass and Illecillewaet valley.

In April of 1872, Mr. Moberly was informed that it had been decided to adopt the Yellow Head pass as the one to be traversed by the railway, and he was instructed to convey his parties and supplies to that point viâ the Athabasca pass. 'This was an undertaking of much difficulty, as the waters of the Columbia river, for about one hundred miles above and nearly the same distance below the Boat Encampment, are obstructed for many miles in different places by very bad and dangerous rapids, riffles and canyons, which render it unnavigable for loaded boats, in places, going down stream, and, during high water, quite impassable for them, throughout, proceeding up stream. The banks of this portion of the river are covered with thick forests, in which the trees are generally of a large growth, the underbrush dense, and from the sudden and violent gusts of wind that sweep down the adjacent mountains at times, the ground is much obstructed by fallen timber.' (See Moberly's report to the Engineer-in-chief of the Canadian Pacific railway, dated 13th January, 1873.)

At the close of the same report the following statement is well worthy of note:—'Considering the enormous distance through a most rugged country that the party, supplies and animals, the past two seasons, have made their way and been transported, the dangerous navigation of the McGillivray branch of the Columbia river, and the very severe weather endured both seasons in the early part of the winters, it is a matter of great congratulation that we have not sustained any loss of life nor had any accidents, that not a single pound of supplies has been lost in transit (coming by way of the Columbia), and out of nearly two hundred and fifty pack animals employed, only seven have died in all, which is not at all sur-

prising, as nearly all the pack animals on this route travelled back and forth last season about two thousand and seven hundred miles and almost invariably averaged loads of three hundred pounds each, except when crossing the divide of the Rocky mountains, when I gave orders to have all the loads lightened.'

I am informed by Prof. Macoun, that Mr. Walter Moberly stated to him, that if he had been permitted to carry out the instructions given him in March, 1872, viz., to survey a route by way of the Big Bend and Howse pass, he would have found the pass subsequently discovered by Major Rogers, as it was his intention to follow up his explorations of 1865 beyond the forks of the Illecillewaet river, and he would, as a sequence, have traversed the pass now followed by the railway.

As one of the earliest, most prominent and most energetic of surveyors and engineers connected with the opening up and development of the mainland of British Columbia, a short sketch of Mr. Walter Moberly's career in that Crown Colony will not be out of place. It is taken, by his permission, from a delightful little pamphlet entitled 'The Rocks and Rivers of British Columbia,' published by him in London, England, in 1885:

Mr. Moberly's interest in the Western or Pacific Coast was first awakened through an intimacy with Mr. Paul Kane, of Toronto, the celebrated Canadian artist, subsequent to his travels across the mountains. He gave Mr. Moberly long and minute descriptions of the various places he had visited, and showed him all his sketches and paintings. Mr. Kane also introduced him to Sir George Simpson, who provided him with letters of introduction to Sir James Douglas, at that time the head of The Honourable The Hudson's Bay Company on the Pacific Coast, and afterwards the first Governor of the Crown Colony of British Columbia.

In 1857, gold had been discovered in paying quantities on the Fraser river. In the same year, the Imperial Commission,

under Capt. Palliser, to explore the British possessions from Lake Superior to the Pacific with the object of ascertaining their resources, had commenced work. So the upshot of it was that, in 1858, Mr. Moberly took passage in the steamer *Hermann*, viâ Cape Horn, for Vancouver Island, where he arrived late that year, his avowed intention being to ascertain whether such an undertaking as overland communication with the Eastern Provinces could be accomplished.

Arrived at Victoria, he was very kindly received by Sir James Douglas, with whom he dined, meeting a number of well known public men of the Colony : Sir Matthew Begbie, Mr. Dallas, Dr. Helmcken, Mr. Donald Fraser and others. Almost immediately he left by the Hudson's Bay Company's steamer *Otter* for Fort Langley on the Fraser river. Here he was most hospitably received by Chief Factor Yale and several other officers of the company. He now proceeded by the little steamer *Enterprise* (Capt. Tom Wright) to the Indian village at the mouth of Harrison river, and took charge of a cargo of goods going up to Port Douglas, at the head of Little Harrison lake. After some interesting adventures with a bad crew, he finally delivered his cargo at the trader's store.

Mr. Moberly then worked his way over the travelled route of rivers, lakes and portages to Lillooet on the Fraser river, tried his hand for a while at placer-mining in the vicinity of Pavilion mountain, used up all his resources and was starved out, had some thrilling experiences on his return journey, and eventually found himself at Victoria again, rather at a loss what to do next. He called on Sir James Douglas, reported to him the information he had obtained concerning the country, and particularly as to the feasibility of building a wagon road over the Harrison-Lillooet trail. By Sir James Douglas he was advised to remain in the Colony and turn his attention to the construction of trails and roads that were certain to be made as soon as possible.

At this juncture, he met Colonel R. C. Moody, in command of the corps of Royal Engineers on service in the Colony, who had arrived in the country while he was in the interior. Colonel Moody offered to attach him to the corps in a civil capacity. He returned with Colonel Moody to Langley and thence to Derby, situated a short distance down the river, and the headquarters of the corps. He was now sent to the proposed site of the new city, where he arrived, with one man, in a leaky boat, towed by the steamer *Beaver*. 'The trees, as a general thing, were of enormous size and the underbrush dense. We made a little pathway for a few hundred feet and came to a magnificent bird's-eye maple tree,* under which I pitched the tent, and founded the city of Queensborough, but which was subsequently re-named New Westminster by Queen Victoria, and from that circumstance is known as "The Royal City."' He was now busy for some time. Fifty men, tools and supplies were sent down from Derby, the various Government buildings were erected, a survey of the city made and the first sale of lots conducted at Victoria. Concerning the country, Mr. Moberly writes: 'The supply of fish is very plentiful, the salmon, of which there are two species—the red and the white—being in enormous quantities. The sturgeon attain a great size. There is a small and most delicate fish known as the "Oolahan" that comes in May and remains a short time. It is about the size of a sardine and very rich, delicate and oily. The salmon will not take the fly on the Pacific coast. There are oysters, mussels, clams, crabs and prawns, etc., etc., but I never heard of a lobster being found anywhere on the Pacific coast. Red deer were formerly very numerous on the islands in the Gulf of Georgia, and are still so on Vancouver Island. The panther and bear were also to be found on the Island. Many wild berries abounded in the woods and some of them were pleasant to the taste.'

* Evidently the figured maple of the western coast is here meant.

Mr. Moberly now left the Government service, and we next find him, in company with a Mr. Robert Burnaby, who had been private secretary to Colonel Moody, exploring for coal in Burrard inlet. While shafts were being sunk, together with Mr. Burnaby, he made a flying trip up the Squamish river, entering at the head of Howe sound, where the Indians reported that gold had been discovered. It proved a wild-goose chase: 'One of the Indians pointed with great satisfaction to a prospecting hole about eight feet in depth and a blazed tree with some writing on it. The writing on the tree was the work of some miners, who had prospected the river the year before, and it informed us that they had been quite unsuccessful.'

The shafts at Burrard inlet were sunk near the foot of Bute street, just opposite 'Deadman's island,' hence the name 'Coal harbour.'

Not having proper machinery to carry on prospecting for coal, the work was abandoned and a return made to New Westminster. In the spring of 1860, he surveyed and secured the site of the present city of Vancouver, and also the south side of English bay. He then entered into a contract, in partnership with Mr. Edgar Dewdney, to build a trail from Fort Hope on the Fraser over the Hope mountain to the Similkameen river on the east side of the Cascade range, to reach gold-diggings on the latter stream. During the spring and summer of 1861, he was engaged, with the assistance of the Royal Engineers, in building a wagon road over the route followed by the trail.

The same summer, the celebrated Cariboo mines were struck and the attention of the Government was turned towards constructing a wagon road to give access to them. Sir James Douglas was in favour of the route to Lillooet and thence to Clinton, seeing that a wagon road from Port Douglas to Lillooet was in course of construction under the charge of Mr. Joseph William Trutch. Mr. Moberly earnestly supported the Fraser canyon route. To use his own words: 'I strongly urged

upon Sir James Douglas the construction of the Fraser river road, as being the great natural and commercial artery of the country, and the probability of its becoming at some period in the future the line for a railway from Canada.' It was finally settled that the road should be built by the latter route. Mr. Moberly and two others having charge of the construction of the portion extending from Lytton to Clinton. It was completed in 1863.

In 1864, Sir James Douglas retired from office and was succeeded by Mr. Frederic Seymour. Mr. Moberly, as Government engineer, was engaged in looking after the construction of the road and other Government work in Cariboo. In the autumn he resigned his position and became elected as member of the first Legislative Council for 'Cariboo East.' In 1865, he resigned his seat and was appointed assistant to the Hon. Joseph William Trutch, who was at the time Chief Commissioner of Lands and Works and Surveyor General.

In the winter of 1859-60, Mr. Moberly had met Capt. Palliser and his party at Victoria. 'Capt. Palliser reported that all hopes of obtaining a feasible line by which to construct a railway through British Columbia would have to be abandoned, as the "Gold" range of the mountains, immediately to the west of the Columbia river, presented an unbroken and impassable barrier.' His personal experience of exploring in a mountainous and heavily timbered country, without roads or trails, rendered him sceptical of the truth of this report, and he now lost no time in organizing a light party to explore the Gold, Selkirk and Rocky mountains. He soon reached the Great Shuswap lake and made a hurried trip to its south arm, noticing a valley running easterly, apparently through the Gold range, exactly in the direction in which he wished to find a pass. The following is quoted from Mr. Moberly's report of February 24th, 1872, to Mr. Sandford Fleming, Engineer-in-chief of the Canadian Pacific railway, showing how the 'Eagle pass' de-

rived its name from the circumstances related:—'In the summer of 1865, I was exploring the Gold range of mountains for the Government of British Columbia to see if there was any pass through them. I arrived at the Eagle river and on the top of a tree near its mouth I saw a nest full of eaglets, and the two old birds on a limb of the same tree. I had nothing but a small revolver in the shape of firearms; this I discharged eight or ten times at the nest, but could not knock it down. The two old birds, after circling round the nest, flew up the valley of the river; it struck me then, if I followed them, I might find the much wished for pass. I explored the valley two or three weeks afterwards and, having been successful in finding a good pass, I thought the most appropriate name I could give it was the "Eagle Pass."'

At this time, Mr. Moberly could do no more than follow the river flowing through the valley a short distance. He was compelled to return to the head of Shuswap lake and conduct his party over the watershed to the Columbia river. He then sent his Indians back for more supplies and, accompanied by Perry, 'the mountaineer,' and an Indian boy, having built a log canoe, started down the Columbia river to connect with a branch party he had sent from Kamloops to try for a line from 'Cherry creek' to the head of the 'Arrow lakes': 'We swept along at a grand rate and, at last, found the river getting narrow, with high rocky banks and overhanging cliffs. I was in the middle of the canoe taking bearings, estimating distances, etc., the Indian boy in the bow and Perry steering. The boy suddenly exclaimed: "Wake chuin chuck kouaway nanuluse," which is: "Bad water—all will be killed"; he put in his paddle and lay down in the bottom of the canoe. I crawled over him and, getting hold of his paddle, Perry and I managed to keep the canoe out of the whirls that threatened to suck us down. At one moment we were on the edge of one of these dangerous places, and the next swept a hundred yards away by a tremen-

dous "boil." Sometimes one end of the canoe became the low, and at other times the opposite end, but at length we reached a little sandy cove and landed in still water. We had run the "Little Dalles" without knowing it.' Having reached the head of the Upper Arrow lake, nothing was seen of the expected party, so Mr. Moberly returned back up the river, experiencing much difficulty poling against the strong current. Landing at a place evidently much used for a camp ground in previous years, a very old blaze was found on a fir tree: 'In black figures, as clear as the day they were written, were latitude and longitude, signed with the name of Mr. Thompson, astronomer and explorer for the Hudson's Bay Company, with the date A.D. 1828, I think. I have, unfortunately, lost my original note of this, but my latitude agreed with him: our longitudes were slightly different. It was valuable information for me.'

Mr. Moberly now ascended the mountains on the west side of the Columbia river, with the intention of reaching the ridge of the range and following it to the boundary line, to make certain that should there be a pass, he might not miss it. Ascending a high peak, he could see a fine valley extending to the far off Shuswap lake and a continuation of it running westerly to the Columbia river, and also a valley extending far to the southward: 'Was this the anxiously wished for pass? How much depended upon it? How would it affect the future prospects of British Columbia? These and many other questions passed through my thoughts during that almost sleepless night. Before daylight, leaving my companions, who could not understand my hurry, to follow after me, I was off to the bottom of the valley and, on reaching the stream, found the water flowing westward and a low valley to the eastward. I blazed a small cedar tree and wrote upon it: "*This is the pass for the Overland Railway*"; and then pushed eastward to the Columbia river, which we reached on the following day.'

Mr. Moberly now returned to his depot on the Columbia, above the 'Little Dalles,' and organized for his exploration into the Selkirks. He entered the range by the deep gorge-like valley of a river joining the Columbia from the east immediately opposite the mouth of the Eagle pass. This river he named 'Illecillewaet' river. It was so designated by the Indians he had with him and means '*a very rapid stream.*' The exploration proved a most difficult undertaking, owing to the extreme ruggedness of the country, the quantity of fallen timber, the dense underbrush and the incessant cold rain that fell in torrents until he reached the *Forks* of the river. He then proceeded to explore the North Fork, on which the party killed a grizzly bear of enormous size, and also a caribou. Finding no practicable pass, he returned to the Forks, with the intention of crossing the range by the southeasterly branch, but winter had set in and the snow began to fall, the scanty stock of provisions was exhausted and the Indians declined to go on, as they feared their squaws and children, left on the Columbia river, would starve if they did not get back before the rivers and creeks were frozen up. So he was compelled to report that the only feasible pass through the Selkirk range would probably be by the *southeasterly* branch of the Illecillewaet river. An account of the expedition has already been given in Part II., Chap. 2, taken from Mr. Moberly's report as published in the British Columbia *Gazette* of the 23rd December, 1865.

In the spring of 1866, miners, merchants and others were greatly excited over the gold discoveries made the previous autumn in the Columbia river section, and Mr. Moberly was kept busy opening up trails and prosecuting explorations. He opened up a trail through the snow from Seymour at the head of Great Shuswap lake to La Porte at the head of navigation on the Columbia river, situated a short distance below the 'Dalle de Mort' rapids, in order to accommodate the great rush of people waiting to get over the pass. He then went to Fort

Helleborus or Indian Poke. (*Veratrum viride*.)

Shepherd on the Columbia river at the crossing of the international boundary and started a party at work on a trail to Wild Horse creek. From Wild Horse Creek he explored up the Kootenay valley, past the Columbia lakes and down the valley of that river to the 'Boat Encampment,' meeting and employing an Indian chief named 'Kinbaskit,' after whom, much to his delight, he named Kinbaskit lake, an expanse of the Columbia river, some twenty-two miles above the Boat Encampment. At the end of the year, owing to a disagreement of opinion with Governor Seymour as to the proper methods of developing the country, Mr. Moberly's office was abolished, and he left the Government service.

From 1868 up to the early part of 1871, Mr. Moberly studied the lines followed by the Central and Union Pacific, the Northern Pacific, the Great Northern and other railways of the United States. He was also engaged in mining enterprises in California, Nevada and Utah and seems to have had many thrilling adventures. In June of 1871 he was called to Ottawa and appointed District Engineer to the Canadian Pacific railway for the country between Shuswap lake and the eastern foothills of the Rocky mountains. In July of this year British Columbia joined Confederation and by the terms of union the railway was to be completed to the Pacific coast within ten years.

Mr. Moberly now organized parties S and T, referred to above, and with party S took up his headquarters a short distance above the mouth of the Blaeberry river, which flows through the westerly slope of the Howse pass: 'Here we formed our depot, intending it to be the main depot on the Columbia river *for the survey I proposed making through the Howse and Kicking Horse passes: along the valley of the Columbia river, around the "Big Bend" from Kicking Horse to Eagle pass, and across the Selkirk range by the valley of the Illecillewaet river and its southerly branch*, which latter and proposed past

I should make after the completion of the survey through the Eagle pass.' Party T was placed at work in the Gold range on the western side of the Selkirk range.

On the 4th December, Mr. Moberly bid adieu to party S, in winter quarters on the Blaeberry river, and started with his Indians to cross the Selkirk range, visit party T and make his way, via the Eagle pass, to Victoria. He descended the Columbia river for a considerable distance, struck into the Selkirk range and came upon the headwaters of Gold river, which stream he descended to the Columbia valley on the west side of the 'Big Bend' and so to the old steamboat landing at La Porte. He now proceeded down the river to the 'Big Eddy,' where he found party T in winter quarters. From here, his route lay through the Eagle pass and Shuswap lake to Kamloops and so on to New Westminster. The bulk of his travelling was done on snowshoes.

The following spring, 1872, it having been decided to adopt the Yellowhead pass for the line of the transcontinental railway, Mr. Moberly was instructed to discontinue his surveys in the Columbia valley, to transfer his parties to the Yellowhead pass and to take charge of the surveys in that district. He now superintended the surveys through the Yellowhead pass and east and west from it, until the end of 1873, at which date, he was instructed to close the surveys and report at Ottawa. He travelled to Ottawa in company with Mr. Marcus Smith, who was then in full charge of the Canadian Pacific railway work, etc., in British Columbia; 'We duly reached Ottawa about the first week in January, 1874, and I found that my plans, etc., had arrived at the office. I had sent them over by Wells, Fargo & Co.'s express. There being no room for me in the office, I secured a room in the Parliament Buildings and conveyed all my plans to it that evening. I then went to the Russell House for dinner, which I had just finished, when a boy ran in, calling out: "The Pacific Office is burning up." I ran at once in the

Old Guardhouse in the Parliament Building grounds, which was used for the railway offices, and saw them in a mass of flames, and pieces of paper and maps flying through the air. A vast amount of valuable information was thus lost to the country, and Mr. Fleming much hampered, as many details for his report were destroyed.'

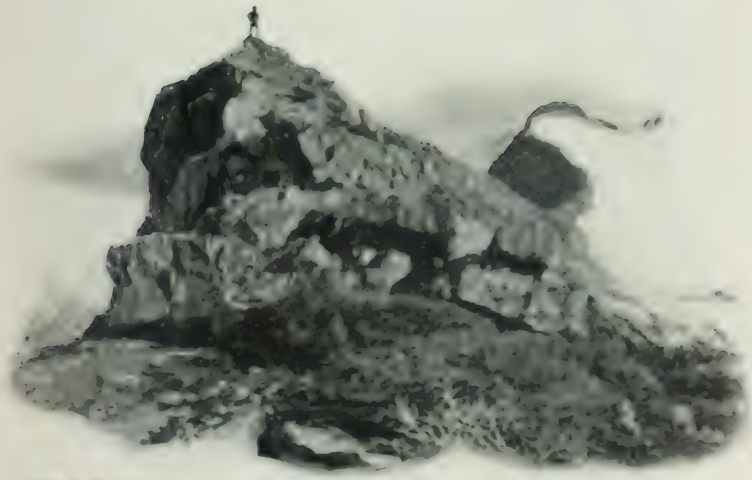
'*Note 2.*—On the eve of sending off my manuscript for publication, I have had the pleasure of reading Mr. Sandford Fleming's last interesting work, "Old to New Westminster," and of seeing the substantial approval such an eminent engineer gives to the line for the Canadian Pacific railway by that route which I from the first recommended to the Government of the Crown Colony of British Columbia, and subsequently to that of the Dominion. I cannot, however, but pay a high tribute to the dauntless energy and untiring zeal that has characterized and, I am glad to say, crowned with success the unwearying struggles of my successor in the mountain surveys, Major A. B. Rogers.—W. Moberly.'

Mr. Moberly took no further part in great public enterprises. The good work that he did and the prominent part that he took in opening up and giving access to the resources of the interior of British Columbia have never been fully recognized. To realize the difficulties he encountered, the years of toil, of hardship and privation he endured, it is necessary to visit the wilderness of mountains, the trackless forests and jungles and the dangerous waterways comprising the territory over which he worked, and, even then, the strides of civilization have been so great of late years that it is difficult to picture these wilds as they were when only inhabited by Indians and by wild beasts, and the influx of the white man was slow and hard.

It has been seen (Part II., Chap. 2) that in 1881-82 Major Rogers had explored and made the first through connection across the Big Bend of the Columbia by way of the Illecillewaet and Beaver rivers and that by July, 1882, he had succeeded in

finding a practicable line across the summit, but was prevented, that year, from making any instrumental survey. At the end of August, 1883, the survey had only reached a short distance beyond the summit, and was not completed the entire distance across the range until 1884.

The Canadian Pacific railway engineers were undoubtedly the pioneer surveyors of the region, the difficulties and interest of the ordinary trial and location surveys of a railway being very considerably enhanced by the character of the country through which the line was being carried, and the numerous and exceptional problems met with at every turn.



On Crest of Mount Abbott

CHAPTER II.

First Topographical Surveys in the Selkirks.

THE first survey of a high degree of precision was made subsequently to the completion of construction and after traffic had been in operation for some time, although, at the date of its commencement, the final gap between the rails as laid from the east and from the west had not yet been closed.

By the terms of union, a belt of land, twenty miles wide on each side of the railway, throughout its entire length in British Columbia, had been conveyed by the Provincial Govern-

ment to the Federal authorities, as compensation for the construction of the road. For the proper administration of the lands within this forty-mile belt, it was necessary that some system of survey should be adopted, whereby the lands disposed of, by patent or otherwise, for the timber, mineral or agricultural portions of the tract might be simply and easily described. It was decided, therefore, to extend to it, in a somewhat modified form, the system of rectangular townships in use upon the plains areas of the North-west Territories.

Owing to the mountainous character of the country, it was impossible to lay out, upon the ground, the base and meridian lines of the system referred to, whereby the smaller parcels of land are readily defined, and consequently some other plan of attaining the same end had to be adopted. The road-bed of the railway furnished an excellent medium. It ran directly through the centre of the belt, its grades were known, and although the excessive curvature was objectionable, it furnished an excellent platform upon which to conduct the work. With the above requirements in view, a traverse, or more properly speaking, a declination survey of the line was made from the Pacific Coast easterly and from the 114th meridian of longitude, near Calgary, westerly, the two surveys meeting at Revelstoke, having extended over a distance of six hundred and forty miles.

A high standard of precision was arrived at in the conduct of the work, the initial points, Port Moody and Calgary, and the intervening points of Kamloops, Revelstoke and Field being fixed in latitude by frequent astronomical observations, and in longitude by electro-telegraphic methods. The latter were rendered possible by the completion of the through line of telegraph and its connection with points where the longitude had already been definitely established.

The deflection angles of the line of direction along the road-bed were measured by a Troughton and Simms 6-inch reiterative transit with three verniers, reading to 30″ degrees (about

14 seconds of arc). For distance the courses were measured by a 66 foot Chesterman steel-band chain, and the lengths checked for bulk error by readings with a modified form of the Lagoot micrometer, an instrument for reading distances automatically. Finally, the work was frequently checked by solar and stellar observations. Reference marks were placed at every third or fourth station occupied, principally on telegraph poles. By the above means, the position of each station could be ascertained in the system of survey projected over the railway belt, and, using the reference marks, the lines of that system, at any time, be defined upon the ground, where necessary. Thus, the railway became a marked permanent base line to which all future surveys within the belt could be referred.

It may be stated as a noteworthy fact, indicating the precision attained, that in the entire distance of 640 miles, the closing in longitude of the instrumental work from the east and from the west came within two chains (132 feet), using the longitude of Chicago on the one hand, and of Seattle on the other, both of which had been previously established by the United States Coast and Geodetic Survey, as longitudes upon which to base the initial points of the respective surveys. The closing in latitude was not so fortunate, an error of some twenty chains between the two portions of the traverse, chiefly due to an abnormal deflection of the plumb-line at Port Moody, being apparent. It is allowed for as a jog upon the 118th meridian, some six miles east of Revelstoke.

The reference marks cut on the telegraph poles may still be seen at intervals, although many of them have been removed in order to renew the poles. They are marked by the letters 'C.P.T.' (Canadian Pacific Traverse) and the number of the reference mark in Roman numerals. Their removal has been offsetted by the marking on the ground of a number of the section lines of the system employed for a short distance from the railway, on either side, and the planting of posts at the section

corners. From Port Moody on the Pacific Coast eastward to Revelstoke, the survey was made by William Ogilvie, D.L.S., in 1885; from the 114th meridian, near Calgary, to the summit of the Rockies, by Thomas Fawcett, D.T.S., in the same year; and the intervening portion, from the summit of the Rockies westward to Revelstoke, by Otto J. Klotz, D.T.S., in 1886.

Mr. Klotz described the summit of the Rogers pass in the following terms:—

'The climax of grandeur in the Selkirks is at the summit: Mountain, rocks, peaks, ice, snow, glaciers, cascades, streams and richly clothed valleys present a panoramic scene that can never be effaced from the memory.' He goes on to say: 'Close observation made during the past winter [before the road was open for traffic] by the Canadian Pacific railway engineers showed that in the west slopes ten snow-slides occurred, the first being on the 29th January and the last on the 4th April. The greatest amount of snow on the track from them was 18 feet in depth, and the greatest quantity about 5,000 cubic yards. The weight of snow-ice, after its descent, varied from 24 to 46 pounds per cubic foot. It was estimated that the maximum velocity attained was from 80 to 100 miles per hour.'

In the course of his operations, Mr. Klotz established the position and altitude above the railway of a number of the prominent Selkirk peaks, recording, for the first time, their height above sea-level by reference to the C.P.R. levels from coast to coast. Among the number may be mentioned Mts. Macdonald (9,440), Sir Donald (10,645), Tupper (9,063), Mackenzie (7,563), and Cartier (8,370); these elevations have been somewhat changed by the present survey (see schedule in Part IV.).

In conjunction with the survey of the railway line in 1886, a preliminary topographical survey of the mountains, valleys and streams adjacent thereto was carried on. It was in charge

of Mr. J. J. McArthur, the veteran topographer of the Department, who in this year commenced his topographical surveys in the railway belt and continued the same without intermission, until the close of the year 1892. He is a quiet, unassuming man, who has probably climbed more mountains in these regions than any other person, and has made a large number of first ascents. No flourish of trumpets ushered him forth to conquest, no crown of laurels awaited his victory; a corps of trained Swiss guides was not at hand to place his footsteps, to check his down-slidings and select for him the surest road. With one assistant, transit and camera on back, many a perilous climb has been made, the rope only being used in the case of most urgent need. In all kinds of weather; through snow, over ice and in pouring rain, many a difficult ascent has been accomplished, many privations encountered and much hardship endured; the only record being a few terse paragraphs in the Departmental Bluebook—short as they are, they are well worth reading.

He commenced work at Canmore on the east slope of the Rockies and closed at the summit of the Gold range, the work during the latter part of the season having been very much hindered by smoke from forest fires. Of the Selkirk mountains, Mr. McArthur says: 'We made the ascent of Tupper mountain, and on this occasion passed over a glacier which was about one square mile in extent. This field of ice, which lies to the north, may be seen from Rogers pass. Immediately to the south is Mount Macdonald, which rises almost perpendicularly from the valley below.

'*Rogers Pass Summit.*—Here we established a station on the mountain on the west side of the pass (Mt. Cheops). There is no scenery along the line of the Canadian Pacific railway across British Columbia to compare with this section of the Selkirks, and it is impossible to describe the magnificent panorama which unfolded itself to our view as we made the ascent and as mountain after mountain came in sight.

'It is practicable and it would be advantageous if tourist trails were made to the summit of a number of the mountains in the neighbourhood. Three miles from Rogers pass the Canadian Pacific Railway Company have erected the Glacier Hotel, from which a fine view may be had of two immense glaciers and Mt. Sir Donald, the summit of which towers above the rest of the chain and is from time to time obscured by passing clouds.'

The work was performed by locating the position of the stations occupied at the various mountain summits from the railway survey, and at these stations taking transit readings upon the surrounding peaks and the stations previously occupied, thus fixing them in position and altitude. The topographical representation was obtained by sketching.

The survey of the railway line, above described, is one of the greatest importance, forming the base from which all subsequent surveys within the Forty-mile Belt have been projected: its precise nature and central position rendering it very suitable for the purpose.

In the year 1887, subdivision surveys along the line of the railway were commenced, the section and quarter section corners nearest thereto being marked on the ground. The principal object was to obtain permanent reference marks independently of the C.P.T.'s cut on the telegraph poles. A number of town sites and claims were also laid out and defined to meet the requirements of those hastening into the country, attracted by the boom caused by the opening of traffic over the road.

No actual work of this nature was done that year in the Selkirks, the nearest approach being the subdivision surveys made by P. R. A. Belanger, D.L.S., between Golden and Donald in the Columbia valley. He also laid out the mining town of Illecillewaet, incorporating the subdivision previously made by the railway company. In the vicinity, a number of veins of rich argentiferous galena had been found: among the number, those at Laurie, previously referred to, the mine at Corbin's pass, visited by Mr. Green, and a number of others. None of

now being worked, with the exception of a single shaft immediately to the east of the village and in view from it, high up on the mountain side. A very steep trail leads to the mine. The ore seems rich, but is being taken out in small quantities, probably little more than is required to perform the assessment work necessary to hold the claim until a better market is found for the product. It is packed on men's backs to a point where it can be loaded on pack animals.

In 1888, the subdivision work along the railway line was completed through the Selkirks by J. I. Dufresne, D.T.S. The same year, D. L. S. St. Cyr made a survey of the Columbia river from Golden to the southerly limit of the Forty-mile belt. He found the distance by the river to be forty-one miles, although the average width of the southerly half of the belt is little more than twenty. At the boundary limit, he placed on each bank of the stream a post ten feet long by six inches square, marked 'Limit of the Railway Belt,' the position of that on the left bank being defined by a bearing tree. In his report, Mr. St. Cyr remarks: 'All the way from the limit of the railway belt down to the steamboat landing, the river winds its way through low marshy meadows, where myriads of wild geese and ducks are seen during the whole summer. . . . . The first important stream which we met with in making the survey, is Canyon creek, on the left side of the river. This stream, which is seven miles above the steamboat landing, is said to carry coarse gold, it being the only stream, with the exception of the Spallumcheen river, in that region where gold has been found. . . . From the month of June to the month of October, that is, during the melting of the snow on the mountains, the Columbia river is navigable as far as the second lake,* a distance of 150 miles. . . . Large trout are taken in the river. The salmon caught in the waters of the Columbia river between

* Columbia lake; the first or northerly one is now known as Lake Windermere.

the steamboat landing and the first lake have wounds and scars, which show the difficulty they have to overcome in reaching the part of the river where they spawn. . . . In the range of mountains bounding the valley of the Columbia river on the west side is "Jubilee Mountain," part of which is included within the railway belt. It is remarkable for the rich deposits of argentiferous galena which have been found there.'

The first attempt at a topographical survey of a portion of the Selkirk range was dictated by the enterprise of a private member of society, the Rev. William Spotswood Green, M.A., F.R.G.S., a member of the Alpine Club and a most enthusiastic and competent mountaineer. The following extracts are from his account of his expedition published in 1891 under the title of 'Among the Selkirk Glaciers.'

The idea was suggested by his cousin, the Rev. Henry Swanzy, who accompanied the British Association to Canada in the year 1884. The Canadian Pacific railway company had then taken the Association over the completed portion of the track to the summit of the Rocky mountains in the Kicking Horse pass. Mr. Swanzy and a companion, Mr. Richard Barrington, continued the journey along the surveyed route of the railway through the Selkirks, using pack-horses for their outfit and supplies, and travelling themselves on foot. They followed the line of march taken by Sir Sandford Fleming and his party the previous year, arriving at Kamloops by the trail through the Gold range, and so on to the Pacific coast. They were, however, more fortunate, in that they had some sort of made trail the entire distance, and were able to take their effects through by pack horses instead of on their backs, as had been the case of the former party. 'Having been ferried across the Columbia river, they followed a most imperfect trail, up the valley of Beaver creek, into the Selkirks and so reached Rogers pass. Often missing the trail, they were compelled to make the best of their way along the precipitous mountain side through tangled forest,

Rev. William Spotswood Green, M.A., F.R.G.S., A.C.

until, descending by the side of the Illecillewaet river, they joined the Columbia in the more westerly portion of its course. . . . . The pedestrian portion of their journey was about 170 miles and as there was always an uncertainty as to what difficulties might lie ahead, they wasted no time *en route*, but even so, owing to the imperfection of the trail, it took them seventeen days from the time they left the railway at Hector pass* to reach the steamer in Shuswap lake. Of the three pack-horses, two only survived the journey. The other poor beast, after numerous falls, became so disabled that it had to be abandoned seven days before the lake was reached.' It was this trip and Mr. Swanzy's description of the scenery that aroused Mr. Green's interest. A brief correspondence with Prof. Macoun in 1887 settled the question and the determination to go was arrived at.

Survey instruments were loaned by the Royal Geographical Society. 'They consisted of a plane table, legs and alidade, which packed into a knapsack case and weighed—as our shoulders knew to their cost—twenty-seven pounds. I had a lighter table made to fix on my camera stand, which we often used instead; and sometimes we fixed the camera by a special screw on to the head of an ice axe, stuck firmly in the snow. I tried to attach the plane table in a similar manner, but the difficulty of levelling and steadying was too great to commend the plan. A prismatic compass, two aneroids, a set of thermometers and a hypsometer made up the list from the Royal Geographical Society.' In addition, a six-inch sextant and three cameras were taken, one for quarter plates, one for half plates and a small Stirn's detective camera, which latter was found most useful and satisfactory. It will thus be seen that the party was well equipped with instruments and that photography formed an important adjunct, although not in the same geometric sense it is now used by the Canadian Topographic Surveys.

* Rocky Mountain Journal, 1888.

In addition to the above, a steel wire, 220 yards long, 'accurately measured before leaving home,' was taken for the purpose of base measuring in connection with triangulation upon which the surveys would rest.

On June 29, 1888, Mr. Green started for New York, bent upon the mission above outlined. Glacier House, his headquarters, was built by the railway company in 1886 as a stopping place, some two and a half miles from the summit of Rogers pass and almost at the junction of the two streams, which, flowing respectively from the Illecillewaet glacier and the east face of Mt. Cheops, unite to form the southerly, or main, branch of the Illecillewaet river. The hotel was a pretty little building nestling among the trees at the base of Mt. Abbott and immediately facing a fine cascade falling 1,200 feet from the opposite slopes of the valley leading to the great Illecillewaet glacier. It was one of several similar buildings erected through the mountains, with the object of relieving the already overburdened engines of the extra weight of dining-cars over the steeper grades of the mountain division.

Soon, however, it became apparent that this beautiful spot would be a favourite with lovers of nature in all its wild grandeur and, in 1887, the house was placed under the management of Mr. H. A. Perley, who, assisted by a capable staff, made himself very popular with the guests, even then, during the summer months, filling it to repletion. Prior to Mr Perley's management, the wants of the travelling public had been administered to by a dining-car crew under a man named Wharton. The house contained some half-dozen bedrooms and an exceedingly spacious dining-room, capable of seating a large number of travellers.

In 1887, a register book was first opened and according to Prof. Fay's computation, previously referred to, 598 guests registered at the house during the year, independently of the daily stoppage of the trains for meals. In 1888, the register

showed an increase to 1,020 and the accommodation was quite inadequate, for it is stated by Mr. Green, that a sleeping-car was brought up and left permanently on a siding to accommodate the occasional overflow from the house. It should be borne in mind that the railway was only completed for through traffic in October of 1885.

One of the minor objects of interest at Glacier House for some years was a tame bear, chained to a post by a collar round its neck. One night, however, it broke loose and wandered off to be seen no more. Some two years later the collar was found one the top of one of the snow sheds at a considerable distance from the hotel.

The day following Mr. Green's arrival, he commenced work upon his survey by measuring a base-line of 660 yards in length along the top of the snow sheds and setting up a flag-pole at either end. From the extremities, a third point was fixed and bearings taken to all the peaks in view. Profile sketches were made, photographs secured and the peaks assigned numbers for future identification.

On the next day, July 19, he ascended to a point observed on Glacier Crest (the ridge between the Illecillewaet and Asulkan glaciers). 'Though not actually the summit of the ridge, it was a good clearly marked position, commanding a splendid view of Sir Donald and all the surrounding mountains, and according to hypsometrical and barometrical measurements was 3,500 feet above the level of the railway line at Glacier House. We remained here for two and a half hours taking observations, photographing, and collecting specimens of antennaria (something like Edelweiss) and other flowers, which were just showing their heads above the rocks where the snow was melting. Looking eastward, the great fall of the glacier formed a fine foreground, and beyond it, Sir Donald rose in bare precipices.'

The next point occupied was that known as 'Green's Peak.'* The view from it is thus described:—'We were on a pinnacle of rock, according to the barometer, just 10,000 feet† above the sea. On all sides were vast precipices and down these precipices our eyes ranged to the green forest-clad valley of Beaver creek, the river being visible for many miles winding with an infinity of curves, 6,000 feet below us. Beyond this river rose a range of hills with flattish plateaux on the top, flecked with snow. Still further to the eastward range rose upon range, fading into purple and blue. Above them all, the Rockies, bearing silvery white glaciers, formed a sharply defined sky-line, and were visible for over 150 miles. This wonderful panorama constituted our view to the eastward. To the southward, it was totally different; in that direction the undulating fields of glacier lay like a great soft white blanket covering up everything for ten miles, beyond which the snow-seamed crags rose, rivalling, probably in some cases surpassing, Sir Donald in elevation. To the westward, other ranges were to be seen, and one huge ridge of black precipices, capped by ice, rose high above the glacier and seemed to dominate the scene. Its foot was separated from us by two intervening ranges, and appeared so difficult of access that we felt but a very faint hope of some day reaching it. (This mountain we named after Prof. Bonney and we afterwards scaled it successfully.)‡

'They were cut off from the last great crag of Sir Donald by a notch 200 feet deep. 'At its bottom a narrow rock arête joined the precipice below us with the face of the final peak. . . . . Had we had a rope about 200 feet long, we could

* Since changed to Terminal peak, a mountain at the north-west corner of the Loop creek basin having been named 'Mt. Green' in honour of this pioneer of topographical surveys in the Selkirks.

† By the topographical survey of the Department, 9,773 feet.

‡ Prof. Bonney, an eminent geologist and explorer, was then president of the Alpine Club.

Mount Robson from above the Lake

have descended from our perch and then easily crossed by the little connecting wall to the main peak, but the face of it looked about as inaccessible a piece of rock as any climber could wish to see. There were a few cracks and ledges which may one day be used by some one, but "the quest was not for me." [*] Bearings to the surrounding peaks were plotted on the plane-table and nine photographs were secured.

The next trip took them to the summit of the snow-field above the Illecillewaet glacier, to see what the ranges and valleys beyond it were like. 'The summit ridge was a saddle of pure snow, quite flat for about two miles, and as it commanded views of well-known peaks as well as of the unknown valleys and peaks beyond, I measured a new base line of 600 yards, and took plane-table bearings from either end. While I was thus engaged with our men, H. boiled the thermometer and determined afterwards our elevation to be 8,729 feet above sea-level, or about 4,600 feet above the railway at Glacier.'

Before returning, observations were taken from a most conspicuous knob of rock on the margin of the great snow-field overhanging Beaver creek. 'The view was supremely grand. Down below great precipices, capped for several miles by a vertical wall of blue and white ice, lay the verdant valley of the Beaver, with its silvery stream. The curved plateaux of the hills beyond looked even more remarkable than when we saw them from the shoulder of Sir Donald and their origin now suggested itself. The cliffs rose vertically from the Beaver valley above heaps of débris covered with forest. The plateaux were separated from one another by low, nearly equi-distant ridges at right angles to these cliffs, and the whole surface seemed covered with grass. On the north side of the low separ-

[*] The second ascension of Mt. Sir Donald was made by way of this peak in 1899 by Monsieur F. Lepitre-Ringuet, accompanied by M. Cordes and the two Swiss guides, Christian Harder and Edouard Feer. It is believed to have taken

' Mountaineering

ating ridges were thin lines of snow, not as yet melted by the summer sun. Standing, as we were, on the great glacier field and noticing the knobs and ridges which bounded it, we could not avoid the conclusion that before the scooping out of the Beaver valley by its stream, glaciers had moved from where we stood, with an even flow over the hilltops opposite, and left these ridges as lateral moraine accumulations. The valley of the Beaver, at right angles to the ancient drainage lines, had no doubt been scooped out by its stream since the passing away of the Ice age.'*

On this expedition a number of topographical features were given names: Geikie glacier, after Prof. Geikie, a noted Scotch geologist and writer on physical science, descends from the Illecillewaet névé immediately north of Mt. Fox and forms with the Dawson glacier one of the most remote sources of the Incomappleux river (Fish creek) of the Indians, flowing to Upper Arrow lake; Mt. Dawson, after Dr. George Dawson, of the Geological Survey of Canada, who so thoroughly and accurately mapped a large portion of the Rocky mountains in 1885-6; Mts. Fox and Donkin, in memory of two fellow members of the Alpine Club, who, with their Swiss guides, lost their lives in the Caucasus while Mr. Green was in the Selkirks; Mt. Deville,† after the Surveyor General of Dominion Lands; Mt. Macoun, after Prof. John Macoun, Dominion Botanist and Naturalist; and lastly, Perley rock, an isolated rock separated from the mountain side by a tongue of glacier. It is on the right-hand side of the ice-fall of the Illecillewaet glacier, at an altitude, according to Mr. Green, of 8,236 feet.‡ There is a fairly level plateau on the top, where camp was placed during this trip. The name was a tribute to the popularity of the manager at the hotel, Mr. Perley.

* The bare range of hills on the east side of the Beaver valley here referred to are locally known as "Bald Mountain."

† Since changed to Mt. Selwyn.

‡ The topographical survey makes Perley rock 7,873 feet above the sea.

The Geikie Glacier, below Mount Fox.

The next move made was an investigation of the Asulkan valley, so called by Mr. Green from the number of wild goat, for which 'Asulkan' is the Indian name, seen at its head and on the slopes beyond during the trip. The valley contains some fine alpine meadows, furnishing excellent pasture lands for these animals and appears to be much frequented by them; it is seldom that a trip is made up it without one or more being seen. The journey proved an easy one and from the col or neck at the head of the valley, dividing the slopes on the north from those on the south, a peep was obtained of the valley of the stream draining from Geikie and Dawson glaciers. From a projecting knob on the south side of the col, photographs were taken and bearings upon the principal peaks.

A reconnaissance was now made of Loop creek valley and on August 6th a camp and supplies taken up it, having in view the ascent of Mt. Bonney. The following day the easterly glacier in the basin of the creek was ascended to the col overlooking the Fish creek valley. It was named 'Lily Glacier' after a daughter of Mr. Swanzy. From the point of vantage gained at the col, the view was found most interesting. 'The unknown valley that we had already got glimpses of from the great snow-field, and from the Asulkan pass, was again before us, but from a new point of view; and now, for the first time, we could see up a large branch valley which was headed by a fine glacier that I have named after Sir W. C. Van Horne. This glacier was most symmetrical in shape, the moraines well developed, and the extensive snow field from which it descended culminated in a perfectly spotless snowy peak.*

'The stream from the glacier was soon joined by others from the smaller glaciers which filled the lateral valleys, and with many a curve it flowed through green alder scrub, to join the stream from the Geikie glacier, a little to the right of the point

* Mt. Purity of Messrs. Huber, Topham and Eaton.

to which our view extended. Until now we had thought that this valley, flanked with fine pine forests, was the outlet of the drainage of this region, now we saw that it brought a fine tributary to the main stream. The outlet was still undiscovered.'

It was ascertained that Mt. Bonney could only be ascended by this route with the greatest difficulty. Photographs were taken and bearings plotted with the plane-table, and a return made to camp with the intention of making the ascent from another quarter. The next and successful attempt was by way of the glacier at the northwest corner of the amphitheatre of Loop creek, the one immediately below the two high summits between Ross peak and Mt. Green. No name has been given to this glacier, so far as I know, and it would certainly be appropriate to name it 'Green's Glacier,' as it has its origin in a snow-field immediately below Mt. Green and there is no record of any one else having ascended to it.* For some reason unknown, the name of Green's Glacier appears to have been given to the small glacier on the southwest face of Mt. Sir Donald, that by which the most frequent ascents are now made. It is difficult to say why, unless it were for the same reason given by Mr. Baillie-Grohman for calling a mountain in the Kootenay district after him, viz.: 'That it was the only one that he had not been on.' For, beyond looking at it from the arête immediately below and to the south of Green's peak (Terminal peak), he did not set foot on it.

With the exception of the small minor peak, seen to rise midway from the rock escarpment of Mt. Bonney by those looking from the east, and the troubles presented by tangled forest and broken rock slides, no difficulties seem to have been encountered in the ascent and the summit was duly reached at ten minutes past three o'clock, a start having been made soon after four a.m. the same morning. The plane-table was set up and a series of observations taken, together with some photographs.

* This has been done

From H. W. Fairman, photo.

ALPINE VALLEY, SHOWING FINE SPECIMEN OF *Pinus albicaulis* NEAR TIMBER LINE.

'The unknown valley with its river (Lardo, which flows to Kootenay lake) glistening like a silver thread, was in view for full thirty miles. To take in all the points of the panorama would have needed hours of work.' At 4 p.m. the descent was commenced, the only difficulty experienced, as in ascending, occurred at the dangerous crossing of the small peak referred to. In attempting to make a traverse of the snow-slopes on the west side, an accident was only narrowly avoided, the snow covering breaking away and the whole mass rushing down the mountain side just as Mr. Green was about to place his foot upon it. Camp was reached at 11 p.m., after some hours of travelling in the pitch dark forest.

Mr. Green's account of the trip and the time taken would preclude the idea that Mt. Bonney can be ascended in one day from Glacier House. From what I have seen of the western faces of Mts. Green and Bonney, I think it can be done from that side in one day, probably in better time than he made by taking two. I had no opportunity to test my theory, as there were so many other peaks that, from a survey point of view, were then of more importance. By running down the grade on a hand-car or velocipede past Loop creek and Cougar water tank to a point opposite the northwest shoulder from Mt. Green, I rather think this shoulder can be ascended to the peak and, skirting the same, the col reached at the north end of the long escarpment, from which point the route would be the same. The run with the hand-car would probably occupy half an hour and no labour needed. The return journey along the railway, up grade, can be made after dark and need not be considered.* Green's ascent of Mt. Bonney was made in 1888, fourteen years have elapsed and there does not appear to be any record of another attempt until the summer of 1902.

* In 1902 it was ascertained that Mt. Bonney can readily be ascended from Glacier House by way of Mts. Abbott and Sugarloaf in one day.

A trip was now made by the railway to Corbin's mine (argentiferous galena) on the north branch of the Illecillewaet river. It was reached by a winding trail for pack animals over the ridge immediately north of the village of Illecillewaet. The point where the ridge was crossed is shown on Mr. Green's map as Corbin's pass. Photographs and observations were taken during the expedition. The party was accompanied by Mr. Bell-Smith, a very well known Canadian artist, who had only awaited the advent of the C.P.R. to take advantage of the strikingly original scenic and atmospheric effects to be found alone in the Selkirks.

An attempt to ascend the Beaver river valley, by crossing the long timbered shoulder from Mt. Macdonald, proved unsuccessful, owing to a pack-pony having been taken. With the utmost difficulty the pony was brought from the track down to the river and then to the crest of the ridge, but could be taken no further. Any one who has scrambled from the railway down and then up the timbered shoulder referred to, will be able to appreciate the difficulties overcome in taking a horse thus far. The ridge was then ascended to the sharp peak seen from Mt. Avalanche, or its vicinity, midway, easterly, between the summit of Macdonald and timber-line. At this point photographs and plane-table observations were taken.

The last expedition carried them to the Geikie glacier, viâ the Asulkan pass. The glacier was measured by a series of plane-table observations and found to be 1,000 yards wide. It was now crossed and the moraine of the Dawson glacier ascended part way to a point where photographs and observations were again taken. The final ascent, that of Mt. Abbott was made for the purpose of obtaining a set of bearings to tie in and connect the points round the circle of peaks that had been sighted upon. During the trip, Marion lake was visited and named after Mr. Green's daughter.

In order to fully appreciate the work done, and the very many difficulties and arduous labour connected therewith, it is

necessary to read Mr. Green's fascinating book, 'Among the Selkirk Glaciers,' published in 1890. Unfortunately, it is now out of print. A map of the area covered by the survey accompanies the book. I have had made a rough copy, which is here appended with apologies to Mr. Green. It will serve to show, in graphic form, the work accomplished by this, the first detailed survey of the group of peaks immediately surrounding the Rogers pass summit. The chief difficulty experienced, and I think it is a difficulty common to all who attempt to travel far from the railway in this vicinity, was that of carrying a sufficient amount of food, together with the necessary instruments and camping articles, to enable him to remain long enough on each trip to do all that was desired and to extend his survey to more distant points. As an instance of the difficulty encountered from this source, may be cited the fact that Mr. Green and his companion were compelled on several occasions to carry double packs, taking one a short distance and then returning for the other, a process which, in that almost impenetrable region, must have been heart-breaking.

During the survey, I found it a very serious problem and one that is greatly aggravated by the heavy precipitation in the Selkirks. As photographs are the essence of our topographical work, it was absolutely necessary to remain at or near a station until they were obtained; this almost invariably meant short rations, or none at all.

In an article in *The Field* of 11th May, 1889, Mr. Baillie-Grohman writes: 'The least said about paths in these amazingly inaccessible upland mountain wilds the better, for I doubt, and my opinion is shared by the few who have, as a Westerner would say, "been there," whether any other known mountain system of the same not very excessive altitudes, offers, on the one hand, so many attractions, and on the other hand, so many difficulties, to impede their exploration as do the Selkirks; but that is, of course, to the genuine explorer, only an addi-

tional charm. As a striking illustration of this circumstance, I venture to cite the fact that the well fitted out alpine expedition of the Rev. W. S. Green failed to penetrate, during several weeks of the toughest mountain work, further than to a point only seven miles in a straight line from the starting point on the Canadian Pacific railway; while Mr. Green, himself, in one part of his paper, states that he and his companion on one occasion made only one mile and a half through the tangled forest in seven hours of hard work. However, it must be said that Mr. Green tackled that part of the Selkirks which he explored from the very hardest and most unpromising point of attack.'

Mr. Grohman suggests that the survey might have been made more advantageously from the south, and that he could then have used, as porters and guides, picked men from a tribe of the Lower Kootenay Indians, who frequent the lake of that name. 'White porters require so much for their own comfort in the shape of blankets and food and are generally so unused to it, that they can pack but little besides their own outfit, while one of these extraordinarily hardy and frugal Kootenays, with nothing but a breechcloth and an old goat skin of his own to carry, will, with a 60-pound pack on his back, walk and climb away from an average mountaineer, while, unburdened with aught but his own outfit of ounce weight and his "fire-spirit" (rifle), I will back a Kootenay to beat by miles, in a long day's climb, the best white mountaineer Switzerland or Tyrol ever turned out; and I am speaking with a twenty or more years' experience in the Alps. . . . A dollar a day [4s.] and food satisfies them; but if game be the sole object, I would advise a stipulated price per head killed by the sportsman, and no day wages.'

Mr. Green's survey was topographical rather than geographical, and his choice of a point of attack undoubtedly a wise one, in that he had Glacier House as a base of supplies and the

railway as a base of operations; otherwise, he must have taken in an extensive camp, with supplies to have lasted until the survey was finished, and had the attendant risk of loss or damage during his absence. For this purpose a number of ponies and men would have been necessary: moreover, as Mr. Grohman states, the Indians 'are no good on ice and won't go on it,' they would have been of no assistance to him in the more difficult of his climbs. His writings and map have had a wide influence the world over, in calling attention to the unique combination of tropical forest growth surrounding alpine peaks and glaciers, found at the summit of the Selkirk range. He may rest content that his work was well done and that not the smallest portion of the time spent upon it was wasted.

The map, of which a copy is appended, is a very fair representation of the main topographical features. For the incorrectly applied name of 'Lardo River,' Mr. Baillie-Grohman would appear to be responsible, for in a footnote, p. 157, 'Among the Selkirk Glaciers,' Mr. Green says: 'Mr. Baillie-Grohman, writing in *The Field* of May 14, 1887, comments on our map, and considers that this river whose glacier sources we surveyed is the Lardo (Lardeaux) which flows into the Kootenay lake. His long experience of the Kootenay country renders it likely that he is right, so I have entered this name in my map.' The paragraph in *The Field* referred to by Mr. Green is as follows: — 'Thus, the big river he (Mr. Green) saw from the top of Mt. Bonney is the headwaters of the Lardo (or Lardeaux), up which I have been several times, which flows into big Kootenay lake, and not, as Mr. Green surmises, into the Upper Arrow lake, a low watershed about sixteen miles in width separating the Upper Arrow lake from Trout or Fish lake, from which the left or eastern fork of the Lardo flows.'

This was a misapprehension, and Mr. Green's surmise was correct, for the stream seen is the Incomappleux or Fish river, and flows to the northeast arm of Upper Arrow lake. In the

light of later knowledge, it is a simple matter to assign these streams to their respective basins; seen in the early days from the summits from whence they were first mapped, it was difficult to follow their windings through the outspread maze of valleys and to place them correctly without an actual traverse from source to mouth.

Looking up Fish Creek.

CHAPTER III.

ROCKY MOUNTAINS TRIANGULATION EXTENDED TO THE SELKIRKS.

IN 1889, a triangulation of the Railway Belt was commenced with a view to establishing fixed points from which sectional surveys could at any time be started; for it was found that, using the railway survey as a base, it sometimes became necessary to run twenty or thirty miles of line to establish a single claim. The work was placed in charge of W. S. Drewry, D.L.S., and commenced at the entrance to the Bow pass, a triangulation

base having been accurately measured in the flats near Cochrane. In conjunction therewith, J. J. McArthur continued his representation of the topographical features, the camera having now been substituted for sketching, as a more accurate and quicker method for obtaining the same. It was ultimately intended to extend the survey to the portion of the Rocky Mountains region of British Columbia under the control of the Federal Government, and to such part of the Selkirk range as lay within the Railway Belt.

The same season, Mr. St. Cyr made a survey of the Columbia river, the easterly boundary of the Selkirks, from Golden northwesterly down the stream, with the object in view of establishing the limits of the Railway Belt in this direction in a similar manner to that done by him the year before.

In the progress of his work, he made the trip by canoe around the Big Bend, a trip that must have been of very great interest, recalling, as it naturally would, the memories of the pioneers of the early days, and chief among them the first to make that identical journey—David Thompson. In his report he writes: 'After receiving the waters of Wood and Canoe rivers, which discharge within a short distance of one another, the Columbia suddenly changes from the northwesterly direction in which it flows from Beaver downwards, making a sharp turn to the south round the northerly extremity of the Selkirk mountains. Here, these mountains lose the rugged aspect that they present when seen from the east; the glaciers and snow-covered peaks disappear and give place to a long succession of well-wooded hills, which slope gently down to the river.' At the same time the limits of the Railway Belt were established on the Columbia, both above and below Revelstoke. The report is chiefly remarkable for the reference to the wholesale destruction of timber in every direction by fire. Alas! it is sad that these immense forests, sources of such great wealth and usefulness, should have been thus depleted.

In July, 1890, two gentlemen, members of the Swiss Alpine Club, entered this section of the Selkirks for the purpose of making an exploration and reporting upon it to their fellow members. They were Messrs. Emil Huber of the Uto section and Carl Sulzer of the Winterthur section. A number of first ascents were made and the peaks, valleys and snow fields examined for a considerable distance north and south of the tract covered by Mr. Green. On their arrival, they found that a well-known member of the English Alpine Club was already there, a Mr. Harold W. Topham, who had been carrying on investigations on his own account with a similar intention of bringing these mountain ranges before his club. They joined forces and together continued their explorations.

All three subsequently published accounts of the information acquired and the impressions arrived at. The two former gentlemen in 'Jahrbuch des Schweizer Alpenclub,' Vol. XXVI. for the years 1890 and 1891, and the latter in the Proceedings of the Royal Geographical Society, Vol. XIII., 1891. In each case, the papers were accompanied by a map of the section explored. No special survey, however, appears to have been made, for there is no reference in the articles mentioned to the use of instruments, other than the camera, aneroid barometer and thermometer. Further, the map accompanying Herr Huber's paper has the following footnote:—'A part of the Selkirks, a rough chart made from photographs and from memory, and referred, in the vicinity of Glacier House, to the Rev. W. S. Green's map.' From the fact that, with a few minor changes, the maps accompanying both papers are practically the same and that the one with Mr. Topham's is published under the joint names of Huber and Topham, it is assumed that Mr. Green's data furnished the ground work in each case; at any rate, of that portion which he mapped from his plane table and triangulation survey.

A rough copy of Messrs. Huber and Topham's map is here

reproduced as the most efficient manner of showing the ground covered by the expedition and illustrating the notes relative to their exploration appearing farther on. The extent of the area covered, taking into consideration the short time spent in the vicinity, represents much hard and enterprising work. It is only by those who have been in these regions and know the difficulties of travel over the routes followed, that the full magnitude of their labours can be appreciated.

W. S. Drewry entered the Selkirk range in 1891 for the purpose of selecting stations and erecting signal cairns, in order that the triangulation then being carried across the Rocky Mountains range through the centre of the Railway Belt, of which he had charge, might be extended thereto. It was necessary to erect signals in advance, to supply points of reference to the observers reading the angles of the triangulation.

During the above year, his operations were confined to the area embraced by the Columbia and Beaver rivers, and on the south by the middle fork of the Spillimacheen river. This tract is in part composed of the bare slopes, viewed from peaks in the vicinity of Rogers pass, under the name of 'The Prairie Hills' and 'Bald Mountain.' With reference thereto, Mr. Drewry writes in his report: 'To the west is the valley of the north fork of the Spillimacheen river, beyond which lies a high range of hills called "Bald Mountain." It extends some ten miles southerly from Grizzly creek between the Spillimacheen waters and Beaver creek. The top of this ridge is covered with grass, excepting a few knobs which rise above the limits of vegetation. Its geological structure seems to differ somewhat from that of the surrounding country, the rocks comprising it appearing to consist of granite, also a rock locally known as porphyrite granite, slates and quartz. Nowhere else in the mountains have I observed such extensive exposures of quartz ledges. Some of these are known to carry gold. Their strike is northwest, dipping at high angle to the southwest. While I cannot give an

Mount Sir Donald, from Bald Mountain.

opinion as an expert, it seems to me that the rock locally known as porphyrite granite is not a granite but a metamorphic rock.'

Referring to the valley of the middle fork of the Spillimacheen river, he says: 'The valley is, for the greater part, of a narrow V shape, with the river rushing through rocky canyons, but occasionally flowing gently through small flats. Snow slides have rushed down on both sides, clearing off much of the timber, which has been replaced by a luxuriant growth of grass, affording excellent pasturage for horses.' Again, of the valley of the north fork: 'Unlike the valleys of other branches of the river, this one is quite broad, the benches and slopes rising gradually from the stream for more than a mile in many places before steeper mountain slopes are reached. . . . The stream is again crossed near the mouth of a considerable creek coming in from the southwest.* Below its mouth for several miles are rather extensive beaver-meadows. At one point we found a canal some 200 feet long, dug to a depth of more than 2½ feet, connecting a pond with the river, which has here a slow current and in many places is from 8 to 12 feet deep. From the fresh cutting and tracks in the sand, it was evident that the industrious inhabitants had been gathering their winter's supply of food, and had taken this mode of floating it from the pond into the deeper waters of the river.'

During the entire trip of three weeks, there were only eleven days in which it did not rain or snow, and but eight of these could be considered clear. 'Such disturbances seemed to be local, as during the whole time, very little bad weather occurred in the Columbia valley. An immense area of ice lay to the northwest, west and south of us, and I am of the opinion that we owed our discomfort to it. On several occasions we saw the clouds forming from evaporation on these glaciers and ice fields, then they began to drift around among the peaks, occasionally

* Probably McMurdo creek of the post-road guidebook.

dropping as rain or snow some of the moisture held in suspension. It was observed that clouds formed in the mountains seldom broke away from them, but discharged their contents within a comparatively short radius of the place of formation. It was noticed by us that the general falls of rain or snow which occurred during the autumn came from moisture-laden clouds moving from the west, probably the Pacific ocean, and flying high up in the air, brushing the mountain tops. Striking the Selkirks, the lower stratum exhausted its moisture and left detached cloud fragments floating around the peaks and in the valleys. The effect of this seemed to be the generation of strong lower air currents moving in the direction of the storm and drawing the cloud fragments into the Rockies and over the summit.'

By the middle of October the snow was knee-deep on the summits and part way down the slopes of the mountains. 'It was, therefore, decided to retrace our steps to the Columbia valley. Before doing so, however, I made an exploratory trip across Bald mountain to the slopes of the Beaver valley. From a coign of vantage on the mountain, a view of solemn grandeur was obtained. I must confess that the feeling of awe and impotence which the spectacle inspired will long remain with one. Facing us and extending to our right, was the dark mass of Mt. Sir Donald, rising 10,625 feet above the sea, with five miles of almost sheer cliffs, 3,000 feet high. To our left, and west of the Beaver, for more than twenty miles, peak after peak towered aloft, surpassing 10,000 feet, but one and all, from top to base, were clad in glacier and snow. Not a living thing was visible, and the sense of desolation and awful loneliness conveyed was overpowering. Nowhere else in the mountains have I seen such immense masses of glaciers and ice-fields, and I believe that but little of the area in which these lie has yet been trodden by man. It could be reached by building about eighteen miles of road up the Beaver valley from Bear Creek station on the Cana-

dian Pacific railway, and I believe would prove a veritable wonderland.'*

Mr. Drewry entered the tract he describes by means of the trail built up the Spillimacheen river, which stream joins the Columbia river some forty miles above Golden at a point known as 'Carbonate Landing.' The trail, which cuts across from this point and divides, ascending each of the three branches of the Spillimacheen river, was built for the use of prospectors who had staked out claims in the vicinity.

In 1892, W. S. Drewry continued his survey of the previous year in the Selkirks. He proceeded up Flat creek, a stream joining the Illecillewaet river from the south, eleven miles west of Glacier House, and 'descended into the Incomappleux (Fish creek) valley by what is locally known as "Jeopardy Slide," an area of steep mountain several miles in extent, which had been swept clean of timber by tremendous snow-slides.'

He refers in his report to the Surveyor General, published in the Report of the Department of the Interior for 1893, to the latter stream as having its sources 'in the immense ice-fields and glaciers lying south and east of the southwest corner of the great ice-field near Glacier House, whence the Illecillewaet river flows, the two streams heading about five miles apart. At about a mile west of the ice, the north fork of the Incomappleux is joined by a large branch coming from the Van Horne glacier, lying almost due south of the confluence of the creeks. The main stream thus formed flows west about three miles and then sweeps around until its course is nearly due south, in which direction it continues for some fifteen miles and then, bearing slightly to the west, goes straight to the north arm of Upper Arrow lake. . . . When in Ottawa, I had seen a map

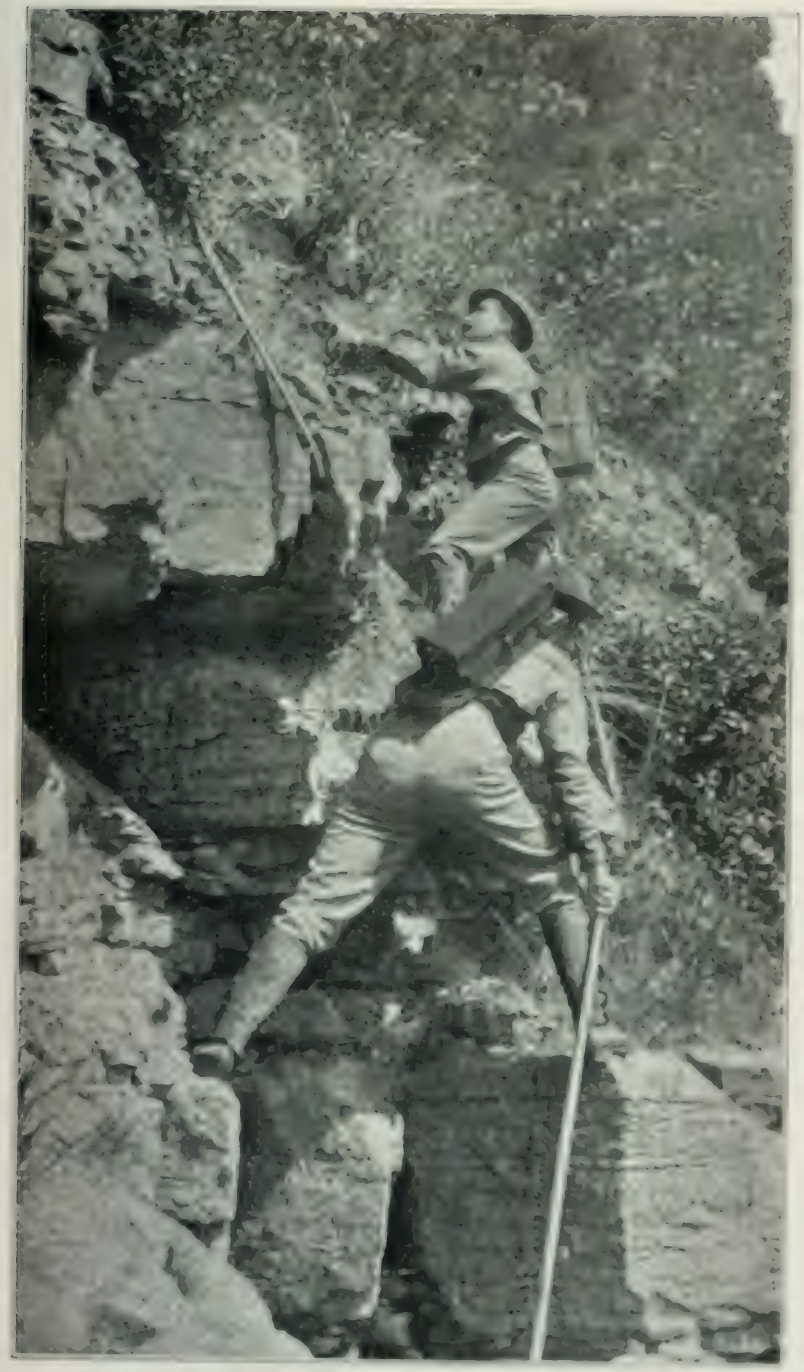
* It was along the eastern edge of 'Bald Mountain' that Messrs. Hetzel, Selkirk, Topham and Forster travelled before descending to the valley of the Beaver river on their way to the source the year previous to Mr. Drewry's survey here referred to.

prepared by Messrs. Huber and Topham in a report of the Royal Geographical Society's proceedings, which showed a peak I also had located from the Spillimacheen river with a view of using it as a triangulation station. The gentlemen named, however, exhibited the mountain as lying near what they called the Lardo river. Upon studying the matter, I had some doubts as to the correctness of their nomenclature, which were afterwards confirmed.'

The peak above referred to would doubtless be 'Mt. Purity' and to reach and establish a trigonometrical station on its summit was the main object of Mr. Drewry's expedition down the Incomappleux river. At the summit of Flat creek pass, an ascent was made on the east side for the purpose of reconnoitring the best route to the peak, and from here the country was photographed and a cairn was built.

On reaching Fish creek, the party proceeded up the valley with the object in view of reaching Mt. Bonney, but the way was blocked by a canyon, through which it was impossible to take horses, and, as the mountain was still clad in deep snow, the project was abandoned. Retracing their steps and continuing the track survey down the creek, some wide snow-slide tracts were crossed, covered with jungles of alders, ferns, nettles and devil's club, growing higher than a man's head. 'There were several miles of this description, making travelling extremely disagreeable, as the nettles stung our hands, faces and necks into blisters, while the sharp thorns of the devil's club pierced us, remaining in the flesh and festering within a few hours.'

Thirteen miles from the Flat creek summit, the first large tributary from the east was crossed. It is called Battle creek in commemoration of an encounter between a prospector and a grizzly bear. About a mile south of Battle creek, close to the main stream, is Battle spring. 'The spring is something of a curiosity, owing to its unusual size—about twenty feet across—and to the fact that its bottom is composed of disintegrated



Topographical Sketching from Top of Summit of a Mountain

granite, which the action of the water keeps boiling, presenting a milky white appearance.'

Battle creek was now ascended and an attempt made to reach the peak selected from the Spillimacheen signal. 'We found that the stream shown as the Lardo by Messrs. Hofer and Topham was none other than Battle creek, which, heading some four miles south of the southerly fork of the Incomappleux, flows south four miles along the west base of the axial range, and there sweeps rapidly around on a curve of about a mile and a quarter radius until it flows north, when it turns abruptly and flows west into the Incomappleux, cutting through the granite range along the stream. Throughout the greater part of its length the valley is almost a canyon, with walls of granite and syenite, in many places upward of one thousand feet high, and at some points exceeding two thousand. We failed to reach the highest point of the mountain selected for a triangulation station, being confronted by sheer precipices of rock or ice at every attempt, but afterwards, we succeeded in placing a signal on a slightly higher peak, 10,000 feet above the sea, some two and a half miles west of the point we had first tried to gain. The height stated was ascertained by aneroid barometer, which showed an ascent of 7,500 feet from our camp on the Incomappleux.'

Having completed the work, the party proceeded down the Incomappleux river, hoping to find the trail under construction up that stream from Arrow lake by the British Columbia Government, but did not reach it by several miles before turning back. A second unsuccessful attempt was made on Mt. Rooney and a return over the Flat creek summit. Caribou creek, joining the Illecillewaet from the north, a short distance east of Flat creek, was next ascended. 'From a mountain near the head of the last-named stream (Flat creek) it was observed that a trough or valley bearing about N. 30° west from Gold hill at the head of Caribou creek apparently extended along the west side of the

watershed of the Selkirks for between twenty and thirty miles from the railway. It is possible that this great depression forms part of the catchment basin of Downie creek, but it is also possible that a portion of it drains into Gold creek, some miles north of the main stream.'*

Mr. Drewry closed his survey by placing a signal on a shoulder of a high mountain lying to the southeast of Twin Butte siding (the northerly Albert peak). Much delay and trouble was experienced from wet weather. During the months of August, September and October, there were fifty-five days during which it rained or snowed, and seventeen were very threatening, with clouds on the mountain tops or down in the valleys; so extreme was the moisture that the tents were mildewed, although they had been standing all the time, except when moving camp. 'The views from the lower valleys are, as a rule, not so fine as those to be obtained in the Rockies, but when the high valleys are reached, the extreme beauty of the scenery surpasses imagination. In many places vegetation reaches the foot of huge glaciers, which descend into nearly every valley; and, as the frosts of autumn touch the various plants, the mountain slopes are clad in a glory of colour, shading down from white and blue of the snow and ice to the sombre green of the firs and spruces in the lower valleys.'

The following season, Mr. McArthur was detailed for topographical surveys in connection with the definition of the Alaskan boundary between Canada and territory owned by the United States, while Mr. Drewry accepted an offer from the Government of British Columbia to inaugurate surveys of a similar nature in the mining districts of that province, some

* But little is known of the interesting portion of the Selkirk range. It has not been mapped in detail and except by a few stray prospectors, has not been travelled. Looking from the summit of Sifton peak, Rogers pass, and Mt. Dawson, the eye meets a long array of snow-caps and glaciers, which, as many time-tables, broken by jutting spurs and timbered gorges, beyond, passing from the general level of the summits. There are four bold snowy peaks about 40 miles [illegible] There is plenty of room here for the explorer

quently, no further progress was made in continuation of the topographical survey of the mountain district of the Railway Belt until the summer of 1901 by the writer.

In 1896, however, a complication was discovered on the International Boundary east of Osoyos on the Okanagan river. Two survey lines were found to have been cut upon the ground: on one, the monuments were standing; on the other, they had been pulled down. Mr. J. J. McArthur (who was again available, the Alaskan boundary survey having been completed), assisted by Mr. A. St. Cyr, was sent in charge of a party to investigate the matter.

Advantage was taken of the occasion to make a topographical survey connecting the Dominion Lands system of the Railway Belt with the boundary line, and to accomplish this a triangulation, supplemented by a camera survey, was carried from Revelstoke southward down the Columbia valley and Arrow lakes. Stations were occupied on both sides of the Columbia to the foot of Upper Arrow lake, notably Mts. Mackenzie, Cartier, Begbie, Sproat, Bald mountain (not the Bald mountain on the east slope of the Selkirks), Mt. Odin and others. In all, twelve signals were set and twenty seven camera stations occupied. The survey covered 600 square miles. Owing, however, to smoke at first, and rain and snow later, the full distance anticipated was not reached.

A base was measured on the long tangent of the railway running south from Revelstoke, known as the Arrow lakes branch of the Canadian Pacific railway. The tangent is within two and a half miles of the town named. It was the same base utilized in the summer of 1901, as already referred to, and with this survey that a connection was made, constituting an accurately defined topographical belt of territory, some miles in width on both sides of the railway, river and lake, extending from Beavermouth on the eastern slope of the Selkirks to Nakusp at the foot of Upper Arrow lake.

In addition to the foregoing, there have been, from time to time, surveyors at work laying out sections and subdivisions of the land system applied to the Railway Belt, where holdings for agricultural and other purposes had been taken up. In 1897, two parties were employed on surveys of this description, owing to a boom having been instituted by the opening up of markets in the Kootenay mining districts, where a number of small towns were growing into existence; one party worked on the Columbia south of Revelstoke, and the other on the same river south of Golden.

Besides these, there were surveys of wagon roads and trails up the main travelled valleys and over the most useful passes, chiefly made by Government appropriations and under Government instructions. And finally, the numberless surveys of mining claims and other private interests, depending for their establishment in position upon the main trigonometrical, topographical, railway base and other surveys previously made.

Looking down Fish Creek.

CHAPTER IV.

TOPOGRAPHICAL SURVEYS IN THE LOWER SELKIRKS OF THE KOOTENAY DISTRICT.

THE trigonometrical and, incidentally, topographical survey inaugurated in the Kootenay mining districts of British Columbia, in 1895, by the Government of that province was placed in charge of Mr W. S. Drewry, who had previously conducted the triangulation in the Rocky mountains, above referred to. The camera was again employed to depict the

topography, and, with some modifications to suit the characteristics of the mining districts, the survey was practically upon the same basis as that conducted by the Dominion Government. The objects of the survey also were the same, viz.: to establish known points to which the surveys of mineral claims, farming lands, timber limits, etc., might be referred.

In opening his first report upon the progress of the work (Crown Land Surveys, British Columbia, 1893), Mr. Drewry gives a short sketch of the geographic conditions of the section of country to which the survey was first applied, and of the means of access and communication brought about, through mineral development, in this region of lakes, rivers, forests and snow-topped mountains. In the after-light of the early days, when David Thompson, Sir George Simpson, the Rev. Father de Smet, Capt. Palliser and others first broke in upon a wilderness tenanted only by a lower type of Indians and the fur-bearing denizens of the forest and the mountain, it furnishes a contrast that is of much interest and represents the progress of very nearly one hundred years. It is as follows: "The south-eastern portion of the Province of British Columbia comprises the large triangular tract of mountains embraced by the great Columbia river, its tributary, the Kootenay, and the forty-ninth parallel of latitude. The western slope of the Rocky mountains and the eastern slope of the Gold range, together with the area above bounded, form the Kootenay district. The rivers mentioned have broad valleys, easy of access, and are navigable throughout a considerable portion of their length.

"Upper Columbia lake is situated in latitude 50° 15' N. at the westerly foot of the Rocky mountain range. From this sheet of water the Columbia river issues and runs northwesterly upwards of one hundred and fifty miles, where it turns sharply, forming the Big Bend of the Columbia. Thence, it flows slightly east of south until it passes from Canadian territory. In the last mentioned part of its course, it expands into the

Arrow lakes, deep narrow basins, typical of a mountain region, occupying some eighty miles of its length and extending to within twenty-five miles of the International boundary.

"The Kootenay river, rising in the Rocky mountains, within fifteen miles of the Canadian Pacific railway,* flows parallel to the Columbia until opposite its source, then, turning sharply, breaking through the western mountain wall, it flows within a short distance of the Columbia lake, and then runs south-easterly, almost in line with the upper portion of the Columbia, until the boundary is crossed at Tobacco plains. After entering United States territory it sweeps around and returns to the Kootenay district in about longitude 116° 32' W., flowing northwesterly. About twenty miles from the boundary it enters Kootenay lake, which is some eighty miles long and from two to three miles wide, lying parallel to the upper portion of the Columbia and Kootenay rivers. The waters of this lake discharge at nearly the centre of its westerly side, through what has been named the west arm of Kootenay lake. This would seem to be rather a misnomer, since a very perceptible flow is found in nearly all parts; while in some of its reaches, under two hundred yards in width, there is a considerable current, which at one point, known as "the narrows," is rapid. This "arm," as it is called, extends some eighteen miles to the town of Nelson, at the foot of navigation on these waters. Below Nelson, the name Kootenay river is again applied to the stream, as it seems might properly be done from the lake to its confluence with the Columbia, which occurs at Sproat's landing, about twenty-two miles north of the boundary.

"The great valleys of these rivers and lakes, together with various connecting passes, are the natural routes of communication within the district. But the Canadian Pacific railway traverses the Rocky mountains and enters the Columbia valley

* On the southerly side of the divide between it and the Bourgeau river.

at Golden, ninety miles from the Columbia lake. After following the valley eighteen miles, the railway crosses the river and a few miles below leaves it by the Beaver valley, crosses the summit of the Selkirks by Rogers pass at an elevation of four thousand five hundred feet above the sea, goes down the Illecillewaet to Revelstoke and recrosses the Columbia, going on westerly into the Gold range by Eagle pass.

'A steamboat plies from Golden to the Columbia lakes, while similar connection exists on the Columbia river and Arrow lake route, between Revelstoke and the International boundary. Steamers also navigate Kootenay lake and river as far up as Bonner's ferry on the Great Northern railway. The last two mentioned routes are joined by the Columbia and Kootenay railway along the unnavigable portion of the Lower Kootenay river. The Nelson and Fort Sheppard railway extends from the town of Nelson southerly by way of Cottonwood creek, Salmon river and Beaver creek valleys to the Columbia, along whose bank it continues to the boundary, where connection is made with the Spokane and Northern railway, tapping the Great Northern and Northern Pacific railways at Spokane.

'The various routes specified are at present the main lines of communication with the supply centres and markets of the world. A branch railway is being constructed from the Canadian Pacific railway at Revelstoke to the head of Upper Arrow lake.*

'Another railroad is nearly completed from Nakusp, on the lake, to Slocan lake, and thence along its shore to the valley of Carpenter creek, up which it goes some five miles to Three Forks, a point fairly in the Slocan mining area, at which ores from many of the various mines can be assembled.†

* This road is now built and running.

† Under the name of the Kaslo and Slocan railway, the road has been completed to Kaslo on Kootenay lake.

'It seems probable that within a short time the construction of a railway through the Crow Nest pass into the Kootenay district will be proceeded with.* After leaving the pass, the line will most likely go by way of Cranbrook along the Moyie and Goat river valleys to the lower Kootenay river and, traversing the southerly portion of West Kootenay, continue westerly. Immense quantities of excellent coal are known to exist in the Crow Nest pass, while supplies of flour and meat can be obtained from the Northwest Territories and Manitoba. This road then, if built, will bring the essentials within easy reach of the population of that portion of the country.

'The prominence of Kootenay as a mining region may be said to date from the construction of the Canadian Pacific railway; because, although considerable quantities of placer gold and some argentiferous galena and copper ores had previously been found, it was only after the time named that the district could be said to have been prospected and mineral bodies systematically worked. So much has been written about its mineral wealth that little need be said here regarding it, beyond the fact that the value of the ore in sight is well up in the millions, while the prospective value seems almost boundless.

'For mining purposes the whole district has been divided into East and West Kootenay, the boundary being an imaginary line passing through the Big Bend of the Columbia and following the summit of the main range of the Selkirks and that of the Purcell range. . . . In addition to the system of railways which will eventually form the arteries of traffic in the Kootenay district, there will be constructed, connecting therewith, a no less important vein system of tramways, wagon roads and trails to points which economic considerations and the physical characteristics of the country place beyond the touch of railroads. The ultimate cost will necessarily be enormous, and mistakes in location or construction in a moun-

* Now built and running.

famous country correspondingly expensive. To assist in the proper location and administration of the construction of the whole it is necessary to have reliable topographical maps and a connected survey of the various important areas. To this end, together with other important objects to be attained, the work of the photo-topographical survey was commenced by measuring a base at Nelson and expanding a net of triangles over the adjacent country.'

This was in 1893; since then the country has much developed: additional mining towns, villages and camps have sprung up in every direction and people have flowed in from all parts. Spur and branch railroads give access to American trunk lines, and to wherever large interests are represented; excellent markets have been opened up for the surplus production of the older and more settled portions of the country; and while, at the present moment, mining matters in the Kootenays are somewhat dormant for various reasons, it will not be long before a steady industry, freed from all fictitious value, will place before the world the wonderful treasures hidden in those mountain fastnesses.

A base was measured at Nelson and a series of triangles expanded therefrom. Toad mountain, rising 7,239 feet above sea-level, was first mapped and the many mineral claims laid out upon its slopes connected with the main triangulation. From here the survey was extended to Ymir peak, 7,618 feet in altitude. The country in the vicinity of Cottonwood and Rover creeks, tributaries to the Kootenay river west of Nelson, was then covered. Referring to this part, Mr. Drewry says: 'Between Rover creek and the Slocan are the greatest falls of the Lower Kootenay, which will probably be utilized as water-power at some future date. The scenery along both Kootenay lake and river is singularly lovely in its colouring, while the fishing is becoming famous among travellers and deer are plentiful in the autumn. As the population of West Kootenay

increases, this region will almost certainly become a favourite place of resort. At Ward's ferry, just below the great falls mentioned above, is probably the best fly fishing water in the mountains, the fish being rainbow trout ranging from one-half to three pounds in weight.'

Work for the season was concluded by mapping the valley of Grohman creek and Mt. Grohman (7,550 feet). This mountain is named after Mr. Baillie-Grohman, previously referred to. He tells the following tale of how it came to be so named:—'I was rather amused on my last visit to the lake (Kootenay) to find that the miners (who had come into the country since my preceding visit) had, as a piece of satirical pleasantry, named after me the only one of all the peaks round the lake which I had never ascended or explored: and when asking my informant, a gruff old prospector, who did not know who his questioner was, for the reason why this peak was so named, he told me that it was expected that it would "let that mountain shimmer out bad" (anglice:—make me very angry) to find on my return that the only peak I had not been on was called after me—a piece of sarcasm my companion seemed to enjoy hugely.'*

The work was carried on for three years, 1893, 1894 and 1895, and covered an area of six hundred square miles. Of these, three hundred have been mapped and the map published. It embraces the area surrounding the central portion of Kootenay lake and shows all mining claims existing at the date of publication: the position of the roads, railways and mineral monuments and the topographical features of the several mountains bordering the lake, together with their respective names and elevations.

At all main triangulation stations, holes were drilled in the solid rock and cairns built to serve as signals for the triangulation and for future reference of mining claims. Very many delays and difficulties were experienced, owing to smoke from

* Mr. Baillie-Grohman, *The Field*, 1895.

forest fires, which seem of yearly occurrence the moment dry weather sets in.

Concerning this dread destroying agency, Mr. Dewdney says: 'The great fires of last year [1894], which overran hundreds of square miles, destroyed an immense amount of valuable timber, in addition to homes and personal property. Nearly all forest fires originate either from lightning, from rubbing together of trees by the wind or are caused by human agency. So far as I could learn, the fires which overran the southern portion of West Kootenay during last summer were attributable to the last named cause, most of them having apparently been started through sheer carelessness and in violation of the law. . . . For many hundreds, probably thousands of years, nature has been at work excavating various channels for unwatering the country under various conditions, and if man changes one of these, he must affect the result. Nature made these drainage works to perform their task within a certain period; so that, if, through the destruction of the forests, they are forced to do their work in a very much shorter time, the result, in a country such as ours, must be a succession of floods and droughts, alternately devastating and parching the valleys; for the surface, being denuded of trees, the accumulated snows of winter will be exposed to the direct rays of the sun and, melting quickly, will rush off, surcharging the streams, causing them to overflow their banks and overwhelm the valleys, while in summer, the greater part of the rainfall will pass off by evaporation from the surface on which it falls. . . . I believe the great body of prospectors and miners are careful about setting out fire, but undoubtedly there are some who are utterly reckless, and even wantonly burn over tracts of country difficult of access, that they may more readily prosecute the search for minerals. So great an area has already been denuded of timber as to warrant the employment of drastic measures for the preservation of what is left; and this nomadic population

should be required to refrain from injuring not only those now occupying lands distant from them, but also posterity, for an increasing number of the people are devoting their energies to the making of homes for themselves and children, and do not regard the public domain as something to be carelessly exploited, but as an asset to be so used as to revert unimpaired to those coming after. . . . It may be stated that in timbering mines from four to six thousand feet B.M. is required for every one hundred feet of tunnel; each hundred feet of shaft uses from fifteen to twenty thousand feet B.M. and stoping consumes from five hundred to four thousand feet B.M. for every thousand tons of ore and rock mined. This gives some idea of the immense quantity which will probably be required in such a country as Kootenay for mining alone.'*

Since the above was written fires have been of yearly occurrence, causing a greater or less destruction of very valuable timber, according to their extent and duration. Comprehensive legislation for their prevention has been enacted from time to time and, as soon as occurring, strenuous efforts are made to extinguish them, but, in this tangled wilderness of forest, the vegetation is so luxuriant and the difficulties of access so great that, once give a fire a good start and nothing short of a dispensation of Providence in the shape of a continued rainfall or heavy snow-storm can extinguish it. While the ubiquitous prospector has, no doubt, his share of responsibility to assume for the above condition of affairs, it is, at the same time, probable that he is credited with a considerably larger one than is his due. Speaking of the condition of the Kootenay Indians and this section of the Selkirks, in 1889, Mr. Baillie-Grohman remarks: 'Their country has during the last two years opened up to a wonderful degree, and to-day three steamers are plying on their lake and river, and hundreds of miners are flocking

* Dewdney's reports, 1884 and 1885.

into their mountains, while embryo towns are springing up where in 1882 there was not a single white man's habitation within a hundred miles. . . . Avalanches are very frequent in spring, and even in early summer; in fact, I know of no mountain system where the eye meets on every side with more numerous evidence of these phenomena; while mountain fires appear to have been quite as busily at work, and at places where human agency in starting them appears as unlikely as possible, considering the entire uninhabitedness of a great part of these mountains until very late years. . . . These fires, of vast extent, burn in some exceptionally dry years literally from spring to autumn. Thus in 1883 the fires north of Kootenay lake were burning for four months, to my certain knowledge.'

The area covered by the survey, surrounding the west arm and central portion of Kootenay lake, was a small one but embraced several of the most important of the mining localities. The excessive difficulties of the work must be taken into consideration—far greater difficulties than are experienced nearer the northerly summit of the range, where the distance from valley bottom to timber line is not nearly so great.

Kootenay lake, one of the chief of the many topographical curiosities that strike an observer of a map of the region, rests at an elevation above sea-level of about 1,750 feet. It presents the striking feature of a deep narrow fresh-water lake, over seventy miles long and not exceeding four miles in width. At either extremity, two large streams enter the lake very nearly together, one of which in each case is navigable for some distance. At both ends, deltas of considerable size are formed, while, from almost exactly at mid-distance, an arm extends westerly, furnishing an outlet from the lake. The mountains surrounding it and lying between the parallel valleys of the adjoining great water-basins reach an altitude of from 7,000 to 9,000 feet, with timber line at from 6,000 to 6,500 feet. These

conditions entailed a climb, with packs containing instruments and camp necessaires, of from 4,000 to 5,000 feet, for each station occupied; through forest, where the same existed, densely grown with thick downward-pointing underbrush and scrub. Where the forest had been swept away by fire or avalanche, the path lay upward through a tangled maze of fallen, blackened tree trunks and heaps of débris. In the case of snow-slides progress through the impenetrable jungle of brush, nettles, devil's club, alder and other growth of tropical luxuriance was out of the question. To these difficulties add heavy snow falls above and pouring rain below, and the hardships and discomforts endured in the prosecution of the work may readily be imagined. The amount of precipitation that fell as snow or rain, during the three years the survey was carried on, seems to have been excessive, and when not raining, smoke from bush fires appears to have been highly detrimental.

The following are the names and elevations above sea-level of the mountains surrounding Kootenay lake embraced by the published map of the survey:—

Kokanee range	9,400
Bluebell Mt.	7,135
Mt. Hooker	8,993
Davie Mt.	7,817
Mt. Irvine	7,760
Ymir Mt.	7,648
Ymir Mt.	7,300
Mt. Loki	9,120
Crawford Mt.	7,700
Sphinx Mt.	8,350
Abehil Mt.	8,400
Mt. Lasca	7,854
Mt. Grohman	7,500
Toad Mt.	7,220
Balfour King	7,406

The map can be had on application to the Deputy Commissioner of Lands and Works, Victoria, B.C. It is entitled 'Topographical Map of Part of West Kootenay District, 1896.'

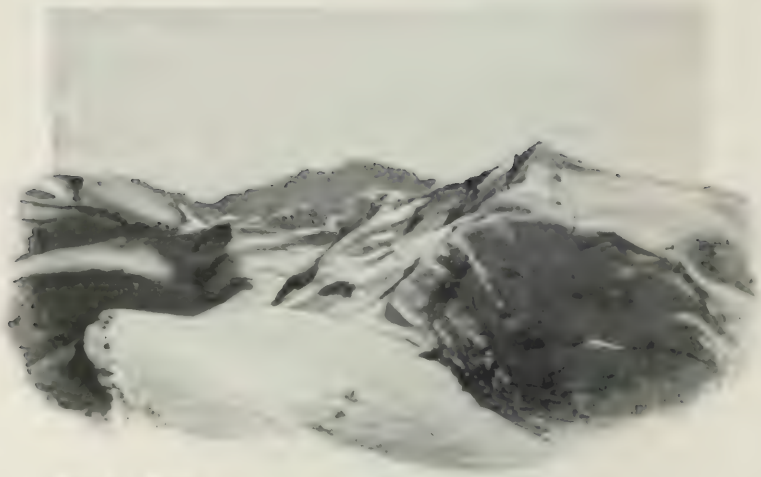
Although, at the end of the 1895 season, the camera was dropped as a medium for obtaining the topographical features

embraced by the triangulation work, the placing of mineral monuments was continued throughout those sections of the Kootenay district where prospecting and mining operations were most active. The method of extending over such sections a network of triangles, expanded from an accurately measured base, was again employed, and the mineral monuments were connected with this system of triangulation. In their turn, it was required by law that all mining claims surveyed should be connected with some one of the mineral monuments established, so that their position would be definitely known and could be placed upon the maps of the several mining divisions prepared from time to time.

During 1896, surveys of the above description were made in the Rossland and Trail divisions by Mr. J. H. McGregor, P.L.S., and in the Ainsworth and Slocan divisions by W. S. Drewry, P.L.S. Maps of these surveys have been prepared and placed on record. Again, during 1897, similar surveys were made by Mr. McGregor in West Kootenay, between the town of Nelson and the International boundary, which section was then being prospected and numerous claims staked out; also in the East Kootenay district in the neighbourhood of Fort Steele and Cranbrook by the same surveyor. Of the latter survey, a separate map has been published showing in the proper relative position all surveyed lands in the portion of the district covered by the work.

As a result of the surveys in the Kootenay mining districts, above enumerated, the Department of Lands and Works for the Province of British Columbia issued in 1898 a complete map of the entire southern portion of the Selkirk range, situated in Canadian territory. It embraces the country lying between the Columbia and Kootenay rivers and the International boundary, or 49th parallel of latitude, and extends northward to include the Lower Columbia lake (Lake Windermere) on the east and the southerly half of Upper Arrow lake on the west. While,

strictly speaking, it is not a topographical map, it shows by name and altitude the position of the several mountains; the various lakes, rivers and streams in their proper relation; the mining towns, villages and camps, and, up to the date of issue, the numerous claims pre-empted; the railways, wagon roads and main trails; the boundary lines of mining districts and divisions; and generally all information that had been gathered to the date of publication. While much progress and development has been made since then, and the map can hardly be called up to date, still it is a good and accurate representation of the country, and, side by side with David Thompson's map of 1812-14, is a fair index of the wonderful development that has taken place in less than one hundred years; development that has changed a vast and unknown wilderness into a populous and enterprising community, toiling to bring to the world's use the treasures stored within the innermost recesses of its mountain fastnesses.



Beyond Battle Creek.

CHAPTER V.

NOTES ON THE UPPER AND LOWER KOOTENAY VALLEYS AND KOOTENAY LAKE, BY BAILLIE-GROHMAN.

MR. BAILLIE-GROHMAN, who has done so much to assist the development of the Kootenay district, both through personal enterprise and through the pen, writes in *The Field* of April 25 and May 2, 1885, an account of his first visit to the Lower Kootenay valley in 1883, and to the Upper Kootenay valley in 1884. The two valleys are here so well described in a few short paragraphs, that the following

extracts cannot but prove a valuable addition to the above notes on surveys extending over a considerable portion of their area.

It is a very great pity that Mr. Baillie-Grohman's writings concerning this remarkable section of the country in which he was so deeply interested, were not published through a more readily obtainable medium. They are now practically out of print and can only be had where old copies of *The Field* are extant.

The extracts referred to are as follows:—

'The second day, in the afternoon, we reached our destination; but a few miles before we caught the first glimpse of the Kootenay river, our surroundings underwent as abrupt a change as could well be imagined. Packriver pass hardly deserves the name of a pass, for the elevation of the watershed between Lake Pend d'Oreille and Kootenay river consists of a long, densely forested, swampy valley, at the height of which two streams flowing in opposite directions have their source in close proximity to each other. Lake Pend d'Oreille is 2,050 feet above the Pacific, the height of the pass 2,190, and Kootenay river 1,750 (not 1,250 feet, as marked on some maps); and, as this difference is distributed over a distance of some thirty miles, one can judge of the easy slopes, of which the much-expected branch line of the Northern Pacific railway from Sandpoint to the Kootenay river will, there is little doubt, in the course of a year or two, take advantage. After passing through the densely forested Packriver valley, one emerges very suddenly into the Lower Kootenay valley, a sunny, open valley of some sixty or seventy miles in length, formed by two parallel ranges of hills, the highest of which, with an altitude of over five thousand feet, deserves almost the name of mountain. The valley, which runs almost due north and south, commences at Bonner's ferry, where the Kootenay river leaves the narrow rock-bound channel it has delved for itself for upwards of a hundred miles, through a rugged chain of mountains that separates the Upper

Kootenay from the Lower Kootenay valley. From the moment the river enters the latter valley it assumes majestic proportions—i.e., an uniform width of six hundred to seven hundred feet, with a similarly uniform depth of from forty-five to sixty feet, unvexed by rapids, eddies or falls, and navigable, so to speak, for a fleet of *Great Easterns*. In great loops the river winds its way through the perfectly flat valley towards Kootenay lake, which terminates the valley, the land gradually merging with the waters of this very beautiful mountain lake, which for scenic beauties is a worthy rival of the most picturesque Swiss lakes I know. To understand the peculiar character of the Lower Kootenay valley, the fact must be pointed out that at one time, geologically speaking not very long ago, Kootenay lake extended up the whole trough-like length of the valley to Bonner's ferry, and that it gradually receded as the depression became filled up with the alluvial silt-like deposits swept down from the upper country by the river, building up new land and affording a very good illustration of Lyell's theory, according to which true alluvial deposits may raise themselves by accumulation above their depositing waters. This explains the circumstance, of which I have never seen the like, at least not on such an extensive scale, of a sixty or sixty-five miles long and from three to four miles wide valley, from end to end almost perfectly level, and gradually merging into the lake at one extremity, the land being nearly on the same level with the water of the lake, and overflowed by it when the spring freshets cause the lake to rise. Through the broad extent of this billiard table-like land—in summer a luxurious pasturage—the stately river flows on its way to the lake, fringed on both sides by groves of fine elm-like cottonwood trees and alder thickets, giving the broad level meadows that intervene between the bank of the river and the densely-forested slopes of the side hills a most attractive park-like appearance, which is not lessened, if we see it in late summer, by the five and six feet high

grasses that grow on these flats in almost tropical rankness, betraying the great fertility of the soil. . . . . .

'Even more interesting to me than the mines was the problem whether the annual overflow of the otherwise very valuable "bottom land" forming the valley of the Lower Kootenay could not by some means be prevented. It was just as well that I first saw the country at its worst, when the huge volume of water with which one has to deal made itself so impressively apparent, for later on in the summer it is hard to believe the extent of the freshet. The facts, as I gradually discovered them in the course of the several months that I devoted to my examination, are simple but of portentous proportions. Kootenay lake, a large though narrow sheet of water ninety or one hundred miles long, has only one outlet for its waters—a torrent-like stream, with rapids and small falls, making a descent of 700 feet in its short course of twenty-five miles, when it joins the Columbia river. During the greater part of the year, this outlet is sufficiently large to control the considerable inflow into Kootenay lake, there being, besides the Kootenay river—the size of which can be imagined from the dimensions I have given (600 feet to 700 feet wide, 45 feet deep)—numerous creeks and streams, rising in the mountains that inclose the lake on all sides, that pour their water into this profoundly deep reservoir. In spring, when the snow begins to melt and the rivers and creeks increase to double and treble their ordinary size, the narrow outlet of the lake no longer suffices; and, finding no other place of discharge, the lake rises, and continues to rise, for more than a month, till at last, about the end of June, its level is from 10 to 20 feet higher than it is about March. As the whole valley is raised only slightly over the level of the lake at low water, this rise suffices to inundate the vast "bottoms" as the flats separated from each other by spurs jutting out from the side hills are called, to a depth varying in different years from 2 feet to 8 feet. The waters fall much more rapidly than

they rise, and in ordinary years the bottoms are high and dry by the latter part of July. Each annual overflow, of course, raises, as I have already said, the surface of the bottoms by a film-like sheet of earthy deposit; and besides, new land is being continually though slowly formed at the mouth of the river, old Hudson's Bay fur traders who have lived in the country for twenty or twenty-five years noticing a marked addition to the land where river and lake merge with each other, even in that comparatively short period.

'Examining the whole problem from a geologist's point of view, it became patent that this land forming process is of comparatively recent origin, for in the eyes of a science that regards a million of years as a short day, the process of building up land at the rate of even as little as half an inch per annum is but of yesterday's origin, and probably brought about by some elementary influence disturbing the relative capacity of inflow and outflow. To me it appeared self-evident that, were the outlet sufficiently large, the lake would not rise and the valley would not be overflowed, or rather, had the outlet continued to remain of the requisite capacity, the valley would never have been formed. The discovery I made soon afterwards, when examining the outlet, seemed to corroborate the correctness of the above surmise. I found that at one place, at the commencement of the outlet, the channel had become contracted by a fan-shaped bar of stones and boulders, washed down from the impending heights by a side torrent. My further and more thorough examination of the conditions brought about by this confining accumulation removed all doubt from my mind concerning the immediate result of removing this bar, thereby restoring to the outlet its original capacity, and thus preventing, it is more than likely, the lake from rising; the solution of the whole difficulty. A work of some magnitude, particularly in so remote a spot, it yet is a feasible one. . . . . .

'The Upper Kootenay valley runs also almost due north

and south, and it lies for its whole length at the very foot of the main Rocky mountains, that here rise very abruptly to great altitudes (from 9,000 to 13,000 feet), affording to the sunny valley nestling along the base of the range, not unlike a moat of a fortress wall, abundant shelter against the bleak north and east winds. The valley is about six or seven hundred feet higher than the Lower Kootenay valley (about 2,400 feet) and has a decidedly dryer climate than the former, a circumstance which we detect at once by the less dense forest vegetation and the vast extent of good bunch-grass grazing areas. While the Lower Kootenay valley, in a reclaimed condition, would be the *beau idéal* of the farmer, the Upper Kootenay valley has undoubtedly a good future before it for mixed farming and stock-raising. Stockmen throughout the west are gradually becoming converted to a more provident policy, one that enhances the value of hay-land, as the handiest means of providing sustenance during the most telling severity of the sharp western winters, the one we are just passing through, by the by, threatening at the time of writing, to prove the most disastrous one of the last twenty years for the cattlemen of the west. In Upper Kootenay there are, besides the very extensive areas of first class bunch-grass country, some very good bottom lands with rich soil occupying the valley itself, and upon which the spring freshets cause a very abundant growth of grass to spring up, affording an almost inexhaustible supply of hay, which now is allowed to rot on the ground, the few settlers that have cattle following the example of the Indians in letting their stock roam over the country winter and summer without care of any kind. The landscape in Upper Kootenay is of a singularly attractive park-like character, framed in by stupendous walls of the Rocky mountains, on which, so near do they appear, one thinks one can see with the naked eye their lordly game, the bighorn. Palliser's Blue book report gives, among the several descriptive passages, the following account of the bunch-grass-zone[1]

"benches" of the valley: "On their level surface, a rider can gallop in almost any direction, so free is the forest from underwood. Sometimes the trees are entirely wanting, leaving great tracts of open plain embosomed in the mountains. Here the Kootenays raise the enormous bands of horses for which they are famous amongst all other Indians, the dry soil and the nutritious bunch-grass producing a breed of superior hardihood and swiftness. There is very fine pasturage in some parts of this valley, and they say that there is hardly any snow on these prairies in the winter, although the cold is severe, so that the horses do not lose their condition even in spring." . . . . . 'Nature has also in the case of the Upper Kootenay valley provided for a remedy to prevent the overflow of the bottom lands, which, though not so extensive as in the lower valley, are nearly as valuable. At the point to which I have already referred as the commencement or head of the valley proper, the Kootenay river, a fast-flowing stream, during high water about nine hundred feet wide and five feet deep, approaches the Upper Columbia lake to within one mile or so, in itself a sufficiently strange circumstance, rendered yet more singular by the further circumstance that the intervening strip is a piece of gravelly land, flat as a billiard table, and raised only from two to three feet over the level of the Kootenay river when at its highest stage, and sloping on the other side towards the lake. Level as this mile wide stretch appears to the eye, the spirit level and theodolite shows that the surface of the Kootenay river is eighteen or nineteen feet higher than the surface of the Upper Columbia lake; a closer examination showing that water percolates from the river into the lake, while, to judge from the account of the earliest intelligent white visitor to this spot—i.e., the afterwards famous explorer and missionary, Father de Smet, the founder of the Oregon missions—it would appear that forty years ago the Kootenay river at freshet season overflowed this land, and sent a portion of its waters into

the Columbia lake. For some reason or other this seems to occur no longer, though numerous traces of it speak to the accuracy of Father de Smet's account. There is little doubt, too, that it was over this intervening strip of land that the progenitors of the salmon now stocking Kootenay lake, as "land-locked" fish, found their way into the waters of the Kootenay, probably during an exceptionally extensive overflow at this point, thus establishing a water connection; no other feasible explanation being possible to account for the presence of the true Pacific salmon in these waters, which, unlike the Columbia, to the very head of which salmon ascend in great numbers, are not approachable for fish that cannot leap the falls of great height that obstruct the Kootenay lake outlet. So favourable are the conditions enabling one to turn the Kootenay river from its present bed over this flat into the Upper Columbia lake, that much of the work of excavating the new channel would be performed by the river itself, the heavy fall assisting this work to a correspondingly important degree.'

As a sequel to Mr. Baillie Grohman's investigations, it may be stated that he received a concession from the British Columbia Government of a grant of land in the Lower Kootenay valley, subject to reclamation. Mr. Baillie-Grohman had conceived the idea that this land might be reclaimed by increasing the waterway of the outlet from Kootenay lake, at a certain point below Nelson, and he spent some time and considerable money and labour with that object in view. The work done, however, proved inadequate. It is very doubtful whether any reasonable amount of expenditure in this connection would have any effect in lowering the waters so as to relieve the flooded area referred to.

A second attempt to reclaim the lands of the Lower Kootenay valley has been made by the British Columbia and Alberta Reclamation Company, which company have expended large sums of money in dyking, but it is doubtful whether they have

had much success. Certain areas have been partially reclaimed, but there yet remains a very large amount of work to be done to complete the enterprise. The company still have several years in which to carry on this work, but little is being done at the present time.

NOTE.

The foregoing chapters aim to give a short description of the surveys of a comprehensive nature that have been made in and around the Selkirks. While the entire range has been more or less thoroughly prospected in search of mineral deposits, many sections are still unknown to the public, except in the most general way. These will furnish excellent fields for exploration and research by mountaineers and lovers of mountain scenery, and for private surveys such as that undertaken by the Rev. W. S. Green. In the latter respect may be particularly mentioned the tracts lying north of the railway, between it and the Columbia river, and south of the railway, between the exploration of Messrs. Huber, Topham and Forster and the large lakes still further to the south; also of the areas to the north and south of Albert Canyon village without the scope of the present work. Here, peaks quite as exalted, glaciers and snow-fields quite as attractive, valleys, grassland alps and hidden lakelets quite as beautiful are to be met with, and will supply a perfectly new field.

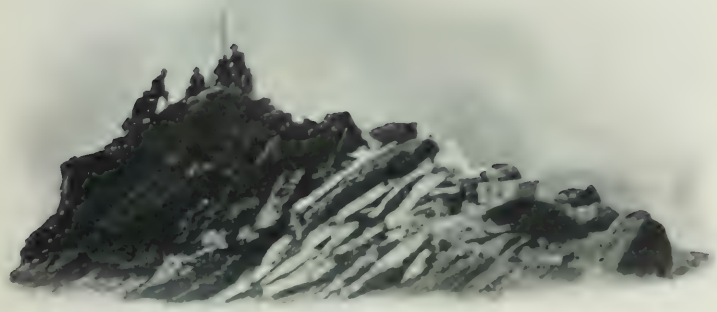
In the survey of the past two years, little new ground has been represented. It was necessary, in order to form the nucleus of a contoured topographical map, to make a beginning somewhere, and this was done along the line of the railway from Beavermouth to Revelstoke. The valley of the Beaver river, from its mouth to its source, the valley of Bear creek, the headwaters of Fish creek and the valley of the Illecillewaet river to its junction with the Columbia valley have been covered.

The survey embraces some nine hundred square miles and forms, with Mr. McArthur's survey, previously referred to, a continuous zone of accurately surveyed territory from the mouth of Beaver river to the foot of Upper Arrow lake. A topographical map of the survey is appended hereto.

A. O. W.

PART IV.

MOUNTAINEERING IN THE SELKIRKS



On Summit of Mt. Sir Donald.

CHAPTER I.

EARLIEST RECORDED CLIMBS.

IN all probability, few people are aware that a Canadian Alpine Club was duly organized during the summer of 1883, a president selected, a secretary and treasurer appointed and the first meeting held. The organization took place at the most suitable of all spots upon Canadian territory, viz.; at the summit of the Rogers pass.

Here, seated upon a grassy knoll, amidst the very climax of Selkirk scenery, the meeting was held. What more appro-

priate! Around, in full view, are all the adjuncts that go to make alpine climbing of interest. The ragged black precipices of Macdonald and Tupper stand grim sentries over an apparently closed gateway. To the north and west the primeval forest rises to grassy alpine slopes decked with brilliant flowers; beyond, are icy glaciers and fields of pure white, sloping gently to the curving ridges that lead upwards to rocky peaks capped with snow.

The sharpest pyramid of 'Cheops' is silhouetted in space; below, the 'Little Corporal' stands at attention, on guard over the hazy blue vistas reaching into the southwest. Around are gently swaying spruce and not far distant a murmuring brook. Aleft, wraps in silent meditation, the Hermit stands upon his ledge of rock, and gazes for all time upon the marvels of creation that surround him.

The president was Sir Sandford Fleming; secretary, the late Rev. Principal Grant, and treasurer, Mr. S. Hall Fleming, Sir Sandford's son. The account of the meeting is given in the president's own words: 'The horses are still feeding and we have some time at our command. As we view the landscape, we feel as if some memorial should be preserved of our visit here, and we organize a Canadian Alpine Club. The writer, as a grandfather, is appointed interim president, Dr. Grant, secretary, and my son, S. Hall Fleming, treasurer. A meeting was held and we turn to one of the springs rippling down to the Illecillewaet and drink success to the organization. Unanimously we carry resolutions of acknowledgment to Major Rogers, the discoverer of the pass, and to his nephew for assisting him.'*

The bold idea of climbing Mt. Sir Donald, then known as 'Syndicate peak,'† was conceived as a fitting virgin attempt of

* See 'Ride Westminster to New Westminster' account of Sir Sandford Fleming's trip in 1883.

† So named by Major Rogers in 1881.

Sir Sandford Fleming.

the Alpine Club, but the idea was not put into execution; however. 'Major Rogers declared that it would be the summit of his ambition to plant on its highest point the Union Jack on the day that the first through train passed along the gorge now travelled.' On that day, Major Rogers was seventy-five miles farther west, for on the memorable occasion upon which the last rail was laid at Craigellachie, he held the ends of the two ties connecting the road-bed from the east and from the west, while the spike that completed the great national undertaking was driven by Sir Donald A. Smith.

As in the case of the Rockies, the pass traversed by the railway lies in the heart of the wildest and best of the mountain scenery of the Selkirk range. In both cases, this circumstance is most peculiar, for at the time the respective passes were decided upon, the promoters were more intent upon obtaining the shortest through connection with easy gradients and the lowest possible expenditure in construction, than the interest and benefit that would accrue to travellers owing to the wild grandeur and variety of the surroundings. In both cases also, the alternative north and south routes would have been lacking in much that now is most attractive and constitutes the Canadian Pacific railway, from a scenic point of view, superior to all other roads crossing the Cordilleras.

The portion of the range in which the road lies may be taken as the centre of attraction from the point of view of both the casual tourist and the bona fide mountaineer. To the north the ground is practically unknown: seen from the summit of the Hermit range, it presents a number of high peaks uprising from among their fellows, and a sea of snow-topped mountains of near the same altitude, gradually falling away to lower and more rounded elevations as the Columbia river is approached at the Big Bend. To the east, beyond the Beaver valley, there are no peaks of any great prominence, the principal distinctive features being the prairie hills, so called, and the bare plateaus of

Bald mountain. Between these and the Columbia, lies the Dog Tooth range. To the west, in parts, much attraction is offered and many groups of peaks rise conspicuously to high altitudes; greater difficulties, however, are presented, owing to the longer climbs to timber line and more dense growth of vegetation found in the valleys as distance is increased from the summit of the range. To the south, until the present time, the only exploration beyond the summit of Mt. Dawson had been made by Messrs. Huber, Topham and Forster. The gentlemen named extended their travels some miles farther south, to the headwaters of the Beaver river, where they ascended a mountain, which they named 'Sugarloaf'; westerly also, they explored to a high peak (Mt. Purity) overlooking Battle creek, a tributary to the upper waters of Incomappleux river (Fish creek). From these mountains they obtained a good look over the country southward and ascertained that the Selkirks of this latitude culminated in the Dawson range. They refer to having seen one 'thumb-shaped bald mountain peak,' towering above its fellows at a distance of fifty miles from where they stood (Sugarloaf), which they put at a possible elevation of 3,600 metres (11,800 feet) and suggest might be Mt. Nelson. Their estimate of the distance would be just about correct to that mountain. Mr. Baillie-Grohman, writing in *The Field* of May, 1889, also states that about twenty-five miles south of the mountains explored by Mr. Green, there is a high rocky peak, quite nameless and virgin at that time, whose southern face (the only one he had seen) appeared to be almost sheer precipice with not a speck of ice or snow upon it, and which peak would afford one of the best rock climbs in the whole of the Selkirk range. He considered it higher than Mt. Sir Donald. There does not appear to be a record of any such peak having been climbed. Thus, it would seem, that extending southward, the range for a considerable distance holds its characteristic features at the Rogers pass summit, viz.: bold rugged mountain tops,

emerging from tropical forest growth, thickly interspersed with glaciers and snow-fields.

As Kootenay lake, distant from Glacier about sixty miles, is neared, the elevations become lower and the difficulties of reaching the ice-fields, snow-fields and rock-peaks greater. Avalanches, bush fires and wind storms have created large areas of piled-up débris grown with rank impenetrable vegetation and mazes of tree trunks hurled one on top of the other in such dire confusion as to present, at the very start, most disheartening problems to the climber. The altitude of the lake is 1,750 feet above sea-level and that of timber line about 7,000 feet, thus requiring an exhausting climb of over 5,000 feet before the actual interest of the Alpine explorer is aroused; even then, when the summits are reached, they are found to exceed little beyond 9,000 feet, and more generally range between 7,000 and 8,000 feet. It may, therefore, be assumed that the field for mountaineering in the Selkirks circles around the Rogers pass summit within a radius of thirty miles. This does not mean, however, that isolated groups and peaks may not be found beyond this limit well worthy of exploration and conquest.

Not having been in Switzerland, the writer can only state the opinions of those who have, when formulating a comparison between the mountain system of that country and the Selkirk range:

The Rev. W. S. Green, author of 'The High Alps of New Zealand' and an old Swiss mountaineer, while expressing no distinct comparative opinion, would seem, from the narrative of his travels entitled 'Among the Selkirk Glaciers,' to have derived a large amount of satisfaction and enjoyment from his sojourn.

Herr Emil Huber, of the Swiss Alpine Club, who visited the Selkirks in 1890, and whose explorations are referred to below, is not so reticent and criticises them pretty freely. He says, in a paper written in 'Jahrbuch des Schweizer Alpen-

club', Vol. XXVI.: 'My readers will be surprised to have heard of so many glaciers in a mountain region where a peak of scant 3,500 metres (10,824 feet) is classed among the highest. It is true, the Selkirks and also the somewhat higher peaks in the centre of the Rockies in this latitude do not come nigh the mountains of Wallis and of the Berner Highlands, but, even if they lack the gigantic stature of the Jungfrau, the Mischabel and the Weisshorn, they nevertheless surpass our mountains, on the whole, in labyrinthine organization, in the production of primeval thickets and the vast number of glaciers. And of the latter, again, scarcely any will surpass the Morteratsch; but those of the Selkirks are all beautiful, seldom defaced by moraines, and on our later expeditions we met with a vast number of magnificent glacier confluents. At all events, we may remain at ease, should travelling accounts and advertising literature of all descriptions state that the Illecillewaet glacier is greater than all the glaciers of Switzerland taken together.' In a footnote is the following:—'Such absurd comparisons of Swiss scenery can very frequently be found in the American tourist literature, which is compiled by people who have never seen Switzerland, and even much less the other end of the Illecillewaet glacier. After all, everything in America is by long odds not the biggest in the world (and elsewhere).'

In the same year and at the same time, the Selkirks were visited by Mr. Harold W. Topham, of the English Alpine Club. In a paper read before the Royal Geographical Society (Monthly record of Geography, Vol. XII., 1891), he makes the following remarks:—'The topography of the Selkirks is peculiar for the great similarity which one part bears to another. A glance at the map will show this. The first thing which strikes one is the great resemblance between the Illecillewaet névé and that of the Deville glacier. Both are of almost equal area, both lie north and south, and both are fringed alike upon the east by a row of small rock peaks, which rise with an almost

painful regularity of detail from out of the Beaver valley below. These peaks are by no means easy of access from the valley. They present at the summit a formidable array of precipitous rocks, which give place lower down to steep grass-slopes, and then to an almost impassable confusion of fallen timber and thick undergrowth. The huge trunks lie piled up, one on top of another, as though giants had been playing with them and tossing them about as a child would its game of spillikins.' . .

'The glaciers of the Selkirks, though comparatively small, are very numerous, and the area which is covered with ice is large in proportion to that which is covered with snow. Where in Switzerland we would find patches of snow, in the Selkirks we may expect to find ice. The great snow-fall in the Selkirks may perhaps explain this. The pressure exerted upon the lower layers of the snow by the great depth of the snow which lies above them, tends to consolidate and to make into ice these lower layers. . . . The great drawback to travelling in the range is the thickness of vegetation at the bottoms of the valleys and the difficulty of procuring men capable of acting as porters over a mountain country.'

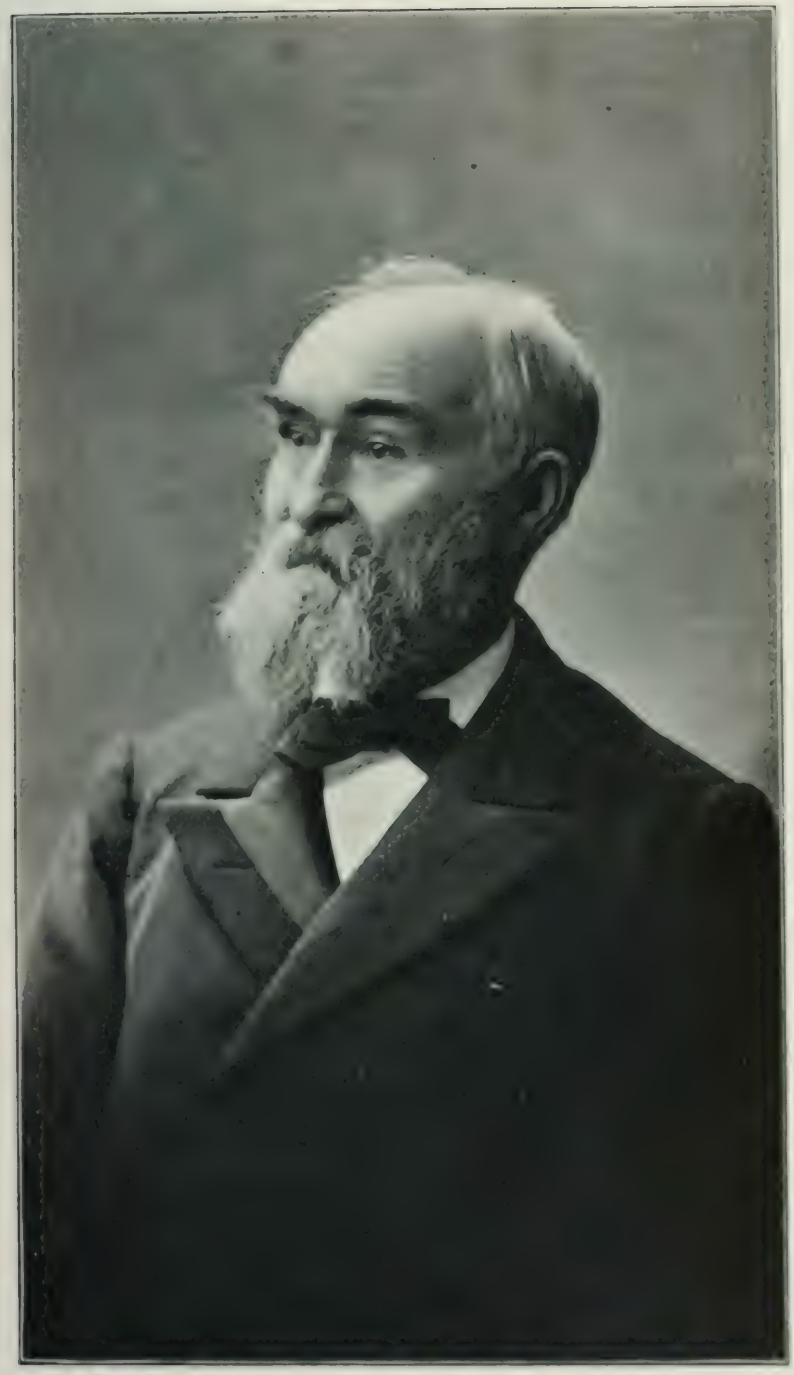
The fact that Mr. Topham found such a 'similarity' and 'painful regularity' in the topographical features of the part of the range he explored is doubtless due to the limited extent of his exploration. This was confined almost exclusively to the extreme summit of the range and the western escarpment of the Beaver valley above the junction of Bear creek. Here, the conditions, now existing, are probably due to the uniform glacial action of a bygone age, which action would account for the characteristic above described. Further west, north and south, much diversity of topographical contouring may be found.

The above were first impressions by men who had travelled largely over other mountain systems. They had come to ascertain the possibilities of the Selkirks from an Alpine mountaineer's point of view. In consequence, their opinions are of

weight. It may be gathered from them, that the Selkirks possess characteristics quite distinctly their own, the main features of which are their dense tropical forests, or the ruins of the same, surrounding each peak, which forests have to be overcome before the eye may gaze upon the immense sea of snow-topped mountains and the snow fields and glaciers enfolded in their arms. It may also be gathered that in number, purity and pleasing configuration of glaciers, the Selkirks are fully able to hold their own with the better known systems of the Swiss and Italian Alps.

The highest peaks of the Rocky and Selkirk mountains do not attain greatly beyond 12,500 feet above sea-level, while those of the Swiss Alps reach to over 15,000 feet and are doubtless more difficult and dangerous of ascent, comprising in a small compass much that in the former range is distributed over a very extended area. From a scenic point of view, however, the Canadian Alps present many attractions that cannot be found in Switzerland, and still have the paramount charm of not being too much done. Their enormous extent will for many years to come provide new fields for exploration and travel.

From one of the loftiest summits of the range the eye wanders over an ocean of snow-caps, all apparently of the same elevation. At intervals, isolated masses rise on high. The regularity of appearance thus presented by the array of summits is, in a large measure, due to the vast extent of the landscape and the immense area covered by the range. Seen from the respective valleys that separate them, the masses present sufficiently distinctive features and ruggedness of outline to satisfy all reasonable demands; they will, moreover, furnish difficulties and dangers enough to interest the most ardent mountaineer without the attendant loss of life that has converted the Swiss Alps into a mammoth graveyard.



40 Professor John Macoun, M.A., F.R.S.C.

The first recorded ascent made near the summit of the Selkirks would seem to be that of Major Rogers in 1881. Having forced his way through the dense forests and matted, dripping underbrush of the Illecillewaet valley, he reached a spot not far from where Glacier House now stands, and, accompanied by his nephew, Mr. Albert Rogers, and some Kamloops Indians, ascended a mountain on the northern bank of the stream for the purpose of seeing what lay beyond. He then looked down upon the meadows at the Rogers pass summit. From the account of their expedition written by Mr. Albert Rogers, and appended hereto, I should judge that the point reached was that lying between Mt. Avalanche and Mt. Macdonald, which would be the ascent most convenient from the summit of the pass where the party had arrived. He would then appear to have continued to the crest of Mt. Avalanche.

In 1883, Mr. Baillie-Grohman first visited the Kootenay district, and in referring to the mountain by the Kootenay lake named after him, stated that it was the only one in the vicinity he had not climbed. The predominant characteristics of mountain-climbing in this section of the range have already several times been referred to.

In August, 1885, Professor John Macoun and his son were camped at the summit of the Rogers pass, opposite Mt. Avalanche, up the slopes of which their first ascent was made on the 15th. The sloping rock of the last 500 feet was found so steep that it was climbed in their stockinged feet. When the crest of the ridge was reached, they were astounded on looking south to see the Illecillewaet glacier immediately below them. By walking along the ridge to the left they were able to ascend to a considerable altitude and could look upon and into the mountains in all directions. Prof. Macoun named the mountain they were on, Mt. Dawson, but it was subsequently changed. At that time, the mountains were full of grizzlies and silver-tips, one of which was killed the day previously, after it had

attacked a man who was drinking at a spring. The point reached would doubtless be Avalanche Crest and the ascent was made up the steep façade fronting to the railway at the summit, a point where avalanches are particularly guarded against.

The next day, August 16, they ascended to the amphitheatre at the foot of the pyramid of Cheops. By passing up to the right of the basin, they ascended up the snow to the foot of the glacier on the left. From this point of vantage they again gazed upon the Illecillewaet glacier. An attempt was now made to reach its forefoot, but it resulted in failure. Glacier House was not then in existence and none of the visitors of the present day can possibly imagine the tangle of brush, logs and fallen trees that filled the river valley at that point. They crossed the Illecillewaet river by the railway bridge and forced their way up the creek coming from the Asulkan glaciers, under the mistaken impression that it was the stream flowing from the Illecillewaet glacier. They had reached the first meadow before the mistake was realized and it was seen that they were bearing too far to the right. After ascending some distance and taking a view of the surroundings, they returned to the railway, feeling that the undertaking was too much for them. 'Evidently we were the first to look down upon the Illecillewaet glacier, as none of the railway men knew that it could be seen at its best from Avalanche mountain.'*

An ascent was now made to the glacier on the flank of Hermit mountain (now Mt. Tupper). To do this, it was necessary to climb for hours through brush up the valley of the creek that carries the discharge from the glacier. They climbed out of the valley to the left and encountered less difficulty after leaving the brush. An elevation of 5,900 feet above the railway was attained before reaching the ice. They did not mount higher than where there was a fine cave, through which flowed

*The Professor was apparently not aware that Major Rogers and his nephew had ascended this same creek in 1881

a small stream of pure water, falling in a cascade down the face of the glacier further up. 'This was the first time I had ever seen glacier ice. My son compared it to rock candy, as it seemed to have been formed by pressure and not by freezing.'

From the point gained the Swiss peaks could be seen rising out of the snow-fields at their feet, but no attempt was made to reach them. Suddenly, the climbers were enveloped in clouds that blotted out everything, and the descent was made in pouring rain. They reached the railway completely soaked, but loaded with plants for their collection. This was on August 24 and ended Professor Macoun's mountaineering in the Selkirks. The sketch was given me verbally by the Professor and is of interest, for there is no previous record of these explorations. The botanical results are also now published, for the first time, in an interesting article on the flora and fauna of the Selkirks, to be found in the appendix.

1886.

In the above year, while conducting the survey of the railway line previously described, Mr. O. J. Klotz climbed Mt. Mackenzie, near Revelstoke, accompanied by Mr. J. J. McArthur, who had charge of the topographical portion of the survey. Mr. McArthur also mentions having established a station on the mountain on the west side of the pass (Cheops).

The ascent is thus described by Mr. Klotz:—'Leaving camp at about six o'clock in the morning, we walked up the track to where we could cross the Illecillewaet on a timber jam in the canyon, and as soon as the river was crossed, we began to climb the mountain through a brulé which was overgrown with young evergreens, poplar and alder, so thickly that it was difficult to force a passage. After a time we entered a strip of open green woods which lay on the opposite side of the mountain stream from the brulé. The change was very acceptable, for the thick brush was loaded with water from a recent rain storm, and we

were drenched by it at almost every step. In the open bush we found more of the shrub—devil's club—already described, than before. After a stiff climb we reached the top of the shoulder of the mountain, and crossing a brulé at the height of 4,000 feet above the track, a pretty little glade was found, with streams running through it, little marshy meadows with small ponds in them, and stretches of rank green grass dotted with flowers. The dark green foliage of the spruce, which were about twelve inches in diameter, gave the place a particularly pleasing aspect. The water in the streams was clear and cold and flowed between banks lined with green grass and moss; it came from the melting snow on the peaks above. Numerous tracks and trails of the mountain goat and caribou were seen. Pushing on, we soon left the last of the timber behind us, being stunted, small and sparse and 1,000 feet from the top of the peak. The west cone above the timber-line is broken shale and clay, with here and there an outcrop of rock. It is covered with short grass to its highest point and trailing juniper grows in patches. Having gained the summit of Mt. Mackenzie at an altitude of 5,896 feet above the track (elevation of track at jam across river is 1,600 feet above sea-level), the view was grand, although the air was not so clear, on account of smoke, as desired. But a short distance away, the east peak, Mount Tilley, rose above us several hundred feet. Between the peaks yawned a ravine, with a glacier, which fed a stream and lake below. Large masses of snow lay on the east peak, in cube-shaped chunks, and helped to feed the lake below. To the south lay Arrow lakes, far away in the valley of the Columbia, and looking south-east over a wide but not very even valley, Mt. Cartier was seen to rear high above the surrounding country. West of the Columbia, on the Gold range, arose Mt. Begbie, with its triple peak and many glaciers, and to the north of it stood Mt. Macpherson.* The junction of the Illecillewaet with the Colum-

* Now known as Mt. McArthur

bia was plainly seen, and also the course of the railway, which could be traced, like a huge snake, for some distance into the Gold range. The thermometer registered 48° Fahrenheit, in the shade (noon of 13th August) and a cold wind was blowing from the south, a few flakes of snow were falling on the peak. After a stay of three hours on the summit, during which time the desired observations and photographs were taken, we began to retrace our steps as rapidly as could be done with safety. At times the rate of descent would be involuntarily great, and the friendly assistance of tree or shrub to stop the sliding feet or body was gladly taken to prevent going over a cliff or precipice. At eight o'clock in the evening camp was again reached, having walked altogether thirteen miles and climbed 12,000 feet.'

Although Mt. Mackenzie and the higher peak, here called Tilley, may now be said to be the playground for the enterprising spirits and amateur prospectors of Revelstoke, still, at that early date of mountain-climbing, it was no small undertaking. Even to-day the climb is found very arduous, owing to heavy undergrowth and matted brulé, encountered before reaching open ground. It is, however, well worth the labour to obtain the grand view over the Columbia valley north and south, up the Illecillewaet to the east and across the Gold range to the west, and is strongly recommended to those who have the leisure to stop over. The Hotel Revelstoke is a good house and, barring the everlasting tooting, shunting and blowing-off steam of the engines, one can pass a fairly comfortable night there. The climb and return can be readily made in a day by getting an early start. In the summer of 1901, members of the survey ascended by way of the jam referred to by Mr. Klotz, and again from the west. Of the two routes, the one by the jam is the shorter and easier.

1887.

Some promiscuous climbing may have been done during this year by prospectors or others, but no record of any such has been seen by the writer.

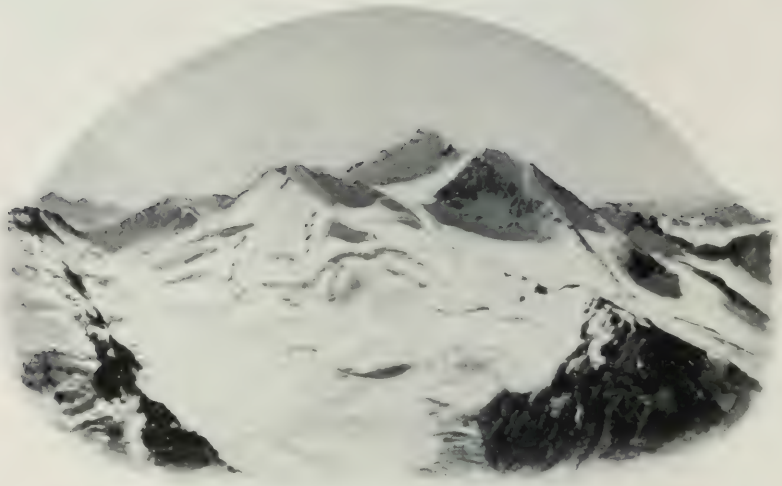
George and William S. Vaux, Jr., made their first visit to Glacier House, which had been opened the previous year, and commenced a series of observations and measurements in connection with the Illecillewaet and Asulkan glaciers, which have been extended over a number of years and resulted in the publication of much scientific data. A reference to the same is made at greater length further on.

1888.

In July, the Rev. William Spotswood Green, A.C., entered the Selkirks for the purpose of mapping the peaks and glaciers surrounding the Rogers pass summit. An account of his survey and the expeditions made to accomplish the same has been previously given (Part III., Chap. 2). He was the pioneer topographer and alpine climber to enter the Selkirks with that object in view, and many of the names in use at the present day were bestowed by him. His principal climbs and expeditions were: Glacier Crest, Illecillewaet glacier and névé; an attempt on Mt. Sir Donald terminating in Green's peak, the Geikie glacier, Asulkan valley and pass, Lily glacier and pass, Mt. Bonney, the Beaver valley and a spur of Mt. Macdonald, a trip to the Geikie glacier by way of the Asulkan pass, and a final climb to Mt. Abbott and Marion lake; not omitting a run down the line to Illecillewaet mining camp and a visit to Corbin's pass. The above list furnishes an extremely creditable showing for a sojourn of seven weeks and represents an immense amount of very hard work and much discomfort.

On his return, Mr. Green read a paper upon the subject before the Royal Geographical Society (Proceedings, March, 1889) and laid before it a map of his survey, embracing within the extreme limits an area of about 500 square miles. His subsequent work, 'Among the Selkirk Glaciers,' published in 1890, is deeply interesting and written in a most sympathetic manner, so that a slight personal knowledge of the region enables the reader to actually accompany Mr. Green on his several

expeditions, see the wonders of nature that he saw and endure the many hardships and privations that he encountered. Unfortunately, the work is now out of print and cannot be had. The book contains a number of good and true illustrations. He subsequently read a paper on the subject before the Alpine Club, briefly outlining his work in the Selkirks. (See *Alpine Journal*, February, 1895.)



Mount Purity.

CHAPTER II.

THE SWISS ALPINE CLUB MAKES ITS APPEARANCE.

1890.

MR. GREEN'S report of his expedition created much comment in alpine circles and directed the attention of those interested in mountain-climbing and scenery towards the Selkirks.

In 1890, both the English and Swiss Alpine clubs were represented, the former by Mr. Harold W. Topham, and the latter by Herr Huber and Herr Sulzer. Two papers upon the

Herr Carl Sulzer.

Herr Emil Huber.

subject written by Mr. Topham appeared soon after his return: one in the *Alpine Journal* of May, 1891 (Vol. XV.), and the other in the Proceedings of the Royal Geographical Society, 1891 (Vol. XIII.).

His headquarters were established at Glacier House. The first expedition carried him to the Dawson glacier, where he camped for several days and ascended Mts. Donkin and Fox (first ascents). 'The latter is very easy, but there is a steep snow-slope at the summit of the former, which requires some care.'

He next descended into the valley of Van Horne creek, 'which contains a series of fine falls,' but was very densely grown with underbrush, rendering walking below timber-line almost impossible. 'There is one golden rule to be observed in the Selkirks: "Keep above timber-line." From the summit of Donkin innumerable snow peaks and glaciers were seen. One peak in particular stood out from the rest, prominent for grace of outline and the beautiful pureness of its snow. I named it, with the license allowed alike to great and small travellers in a new district, Mt. Purity.' A return was made by way of the Illecillewaet névé, and thus was cleared up 'what had hitherto been something of a mystery—the extent of the névé: and we found that it does not extend farther than Mts. Macoun and Fox and is entirely disconnected with the Deville glacier, which is fed from a different source.'

Mr. Topham was now joined by a friend, Mr. Forster, and together they crossed the Illecillewaet névé to its southerly extremity, immediately west of Mt. Macoun, and descended to the Deville névé, thoroughly exploring it and the Deville glacier, and also ascending to the peak of the Dawson range, south of Mt. Fox (Mt. Deville). It was ascertained that the Deville névé, besides feeding the glacier of the same name, sends down quantities of ice in a fine ice fall to the Grand glacier flowing to the Beaver valley near its southern extremity. 'The last is

the largest glacier which we found, and is considerably larger than the Illecillewaet.'

At this stage, Messrs. Topham and Forster joined forces with Herr Carl Sulzer and Herr Emil Huber. An account of the explorations and ascents made by the two last-named gentlemen, and later by the two parties jointly, appears in 'Jahrbuch des Schweizer Alpenclub, XXVI.' for the years 1890 and 1891. They are set forth in two well written and detailed articles, entitled 'In the Highlands of British Columbia', by Emil Huber, and 'Mountain Tours in the Far West' by Carl Sulzer. A synopsis of the two papers is here given:—Headquarters were at Glacier House, where Messrs. Huber and Sulzer arrived on the 21st July, 1890. The day following, an ascent was made of 'Glacier Crest,' the wooded ridge rising to the south between the Illecillewaet glacier and Asulkan creek. For some time they followed the course of the great glacier, passing a forest laid low by an avalanche, until the foot of the wooded crest was reached. The forest primeval was now entered, 'a forest beautiful to behold, filled with difficult impediments, with fallen trees traversing each other in all directions, with thick, obstinate brushwood, with thorns and prickles and cobwebs. Soon we ascended the steep slope, climbing most of the time along the mighty fallen trunks of the white cedar and Douglas fir.'

They reached a summit of the crest at an altitude of 7,353 feet (by aneroid). 'Quickly a small pile of stones was erected as a tripod for the photographic apparatus, which, slowly revolving on its foundation, dutifully, as always, received on seven consecutive plates the magnificent mountain panorama.'

Then follows a description of the peaks pictured in the several views, commencing with the ice-fall of the Illecillewaet glacier, 'which, bursting asunder into innumerable pieces, falls some 3,500 feet into the green valley below.' Next was pictured Sir Donald; 'then further and further the apparatus

Photo. H. W. Shrader, Seattle.

THE RUSSELL AND ILLECILLEWAET GLACIER FROM TRAIL TO AVALANCHE CREST.

turned from right to left and successively were pictured the extended precipitous mountain-crest of Eagle peak, the pyramid of Mt. Avalanche and the fork of the double-peaked Mt. Macdonald, the latter being the northerly outpost of the Mt. Sir Donald chain' (Herr Huber seems to have applied the name of Eagle peak to that now known as Uto peak, the name of Avalanche to Eagle peak and Macdonald to Mt. Avalanche; for Mt. Macdonald opposite to Mt. Tupper is not double peaked), and so on, the panorama continued throughout the circle. 'The entire landscape produced the unmistakable character of granite mountains and by many a peak were we reminded of a "double" in our native Urnerland and Bernerland.' The view obtained of the southerly face of Sir Donald, the prime object of attack, was not very promising and it was decided to take a look at the northeast side from Eagle peak (Uto peak) before attempting its ascent.

First Ascent of Uto Peak.

Preparations were now being made to ascend Uto peak (spoken of by Herr Huber as Eagle peak). A man named Harry Cooper was engaged as porter.

'On the same evening, a man from New York, who had made some tours in Switzerland, put in his appearance among the visitors at Glacier House. . . . Now, this gentleman had planned to ascend Mt. Sir Donald on the next day, and he proceeded with his two men to the glacier in order to camp there. The danger, however, that he might rob us of the first ascent was not great, for he evidently was not in earnest. We were soon assured of the fact. They had thought it better to turn their backs on the mountain and leave the glory to us; for about noon the next day, July 23, they returned to Glacier House, after having achieved nothing. The gentleman immediately left by the train, and as our expected man from Donald could not enter into our service, we quickly engaged the younger

of the New Yorker's companions, a sportsman named Harry Cooper.'*

A tent, cooking utensils, provisions and the instruments, cameras, etc., were now collected and at 4 p.m. on the 3rd they, 'full of the conqueror's glee, strode off, for we did not intend to return to Glacier House again until we had placed our foot upon the summit of Mt. Sir Donald.' The foaming Illecillewaet was crossed on a fallen trunk and ascending the opposite slope, through the obstinate undergrowth, they camped for the night on a small plateau, at an altitude of 5,900 feet, selected the day previously. (The plateau is probably that shown as camp No. 1 in the accompanying sketch.)

On the way up, the porter, Harry Cooper, was suddenly taken ill. Without delay, the tent was removed from his pack and placed upon the top of a bush 'in order to secure it against the teeth of the many ravenous rodents which abound in those mountains.'

Owing to the absence of the tent, they spent a most miserable night. 'Already before, the mosquitoes, which pestered us in the Selkirks, had forced many an uncouth word from our lips, but in such thick swarms as here they had never tortured us.'

At daybreak on the 24th, Messrs. Huber and Sulzer started climbing over the sloping plateau behind their camp. 'Suddenly the view was opened to the south, over glaciers and snow-fields, over valleys and bold rock figures. We had already gained a considerable height and our eyes could see far into the south-west. Before us lay a somewhat steep field of snow. Down to the right, the dark fir breathed fragrance and the Illecillewaet glacier sent its masses of green ice into the abyss. To the left, the base flank of Eagle peak (Uto peak) arose, but directly opposite us the shadowed, dark, really magnificent figure of Mt. Sir Donald towered into the sky, mounting with a sudden leap

* The gentleman here referred to was B. S. Cresswell, of New York; his version of the attempted ascent will be found further on.

1,000 metres (3,280 feet) from glaciers and heaps of débris to a lofty peak.'

At about 11 a.m., the arête between Eagle and Uto peaks was gained and they gazed 'far beyond the deep green valley of the Beaver Creek, far beyond the eastern foot-hills of the Selkirks, and over to the hazy snow-topped peaks of the Rocky mountains, in the distant blue. We stood upon the mighty partition which, extending from northwest to southeast, confines the glacier lands of the Selkirks on the east. What a contrast! Ascending in a southerly direction towards the peak upon the precipitous ridge, we perceived at our left, gently sloping forms of wooded green heights, but at our right peak after peak, black naked prongs, and ice-clad ridges pierced the blue sky, and between right and left stood the mighty mass of Mt. Sir Donald; altogether a picture of peculiarly rare beauty.'

The arête was then ascended to the peak, which was placed at somewhat over 9,500 feet in height,* the camera put in action and a stoneman (cairn) erected. 'Separated from us by a deep chasm, Sir Donald here loomed up into the sky, and his northern side appeared, in this locality at least, even less promising than his west side. The choice thus lay between the northern ridge and one of the snow-couloirs on the southwest side.' On the way down, a new camp ground was selected in the basin at the foot of Mt. Sir Donald.

First Ascent of Mt. Sir Donald.

Camp was now moved from the plateau first occupied, around the spur from Eagle peak, to a point 1,115 metres below the summit of Sir Donald, an altitude of 7,150 feet, and pitched at the uppermost border of the 'scanty dwarf conifers.' Much delay and difficulty was experienced from the downward growing alder thickets '*Alnus Rhombifolia*, whose trunks grow poising downward to the valley and then slightly erect their

* Uto peak is 9,016 feet.

heads. The descent through such brush is easy, but the ascent goes against the grain.'

On the morning of the 26th, before 4 o'clock a.m., 'under the stars fading in the morning twilight,' a start was made for the summit. They now moved for the lower extremity of the rock ledge bounding the glacier on the southwest face of Sir Donald, and advanced up that glacier 'step by step, fastened to the rope,' towards the small peak ascended by the Rev. W. S. Green in 1888. 'To the right, a small hanging glacier precipitated towards us in beautiful séracs, giving the picture a great resemblance to the Roththal of Lauterbrunnen.' Their attention was now attracted by a body of snow reaching into a steep couloir, 'which four days previously, from the opposite valley, we had divined rather than perceived, and had chosen for the place upon which to make the attempt.' Here the bergschrund was encountered and proving impracticable, they were forced to traverse it to the left and make the attack up a branch couloir. The couloir terminated in a little cave within the edges of the nearly vertical faces of the rock cliffs. 'The cliffs here very narrowly closed in upon each other and for some metres stood almost vertical.' It was necessary to force a way up by propping the body in the angle against the rocks of each side.

At 8.45 a.m. some lunch was taken and the slope above examined. 'To the left, an almost unbroken high wall of rock extended to the main crest of the mountain. To its right, a fairly smooth precipitous flank, here and there interrupted by snow and moraines, reached to the rocks of the southern ridge.' Proceeding again, no difficulty turned up, the rock was rough, but where steep, furnished good hubls on the many projections. They kept as much as possible to the rocks, seldom taking to the snow. Further up a stiff climb ensued. Impatiently they climbed over the last rock and shortly after 9 o'clock arrived at the main crest and 'gazed beyond upon the undulating tops of

Mount Sir Donald from Mount Abbott

the foot-hills, upon the far-stretched row of blue peaks of the Rocky mountains. New pictures developed in the south, pictures which two days ago on Eagle peak had been hidden from our view by Sir Donald. We were now standing already higher than the Rev. Mr. Green had been two years ago. After a short stop, the "Grat"* was followed, partly along its uppermost edge, partly along the shelving of the west flank. Many a difficulty was overcome, but the peak always approached nearer and nearer. We were sure of it by this time, and a little after 10 o'clock a loud "Hurrah S.A.C.!" burst forth into the blue sky.'

A vivid and picturesque description of the scene stretched out before them from this towering, isolated point of vantage now follows; lack of space will not permit of its reproduction, and, moreover the view in its entirety is the same to-day, while a better knowledge of the peak and its approaches and the assistance of trained Swiss guides render the glories of this grandest panorama of the whole two ranges very much more accessible than in 1890—so much so that, during the past two summers, three attempts were made by ladies, two of which were successful, the other failing owing to an unforeseen storm. Special mention is made, however, of Mt. Purity. 'The finest view presented itself in the southwest and south. Above the undulations of the Asulkan and Illecillewaet glaciers and opposite a deep valley, the fine group of Mt. Dawson arose with its two corner-pillars, Mt. Donkin (W.) and Mt. Fox (E.). But the most beautiful mountain of all appeared above the opening between Mt. Dawson and Mt. Donkin. It was Mt. Purity, very properly so called by Mr. W. H. Topham, a snow mountain of the finest order.'

Mr. Huber's measurements by aneroid barometer place the highest point of Mt. Sir Donald at 3,272 metres (10,732 feet).

* A steep ridge (an arête).

assuming the height of Glacier House above sea-level to be 1,256 metres (4,120 feet). The results of the observations by the topographic survey in 1901 place the summit at an altitude of 10,808 feet. This result is the mean of seventeen sets of angular readings, commencing from Mt. Mackenzie, near Revelstoke, and continued eastwards. The several sets of readings have been referred to the accepted altitude of the railway at seven different points. Rail level at Glacier House is accepted at 1,093 feet.

At the summit Herr Huber took some photographic views, while Herr Sulzer and the porter, Harry Cooper, built a cairn.* 'In a bottle specially taken for the purpose, the following memorandum was placed:—

"Emil Huber
Zurich, Switzerland, and
Carl Sulzer
Winterthur, Switzerland
Members of the Swiss Alpine Club
Porter, Harry Cooper

climbed from small glacier on south side through couloir and south arête to summit on July 26th, 1890. Left camp at 3.50; arrived at summit at 10.15. Wonderful view. Three cheers for Switzerland!" '

The return was made by same road as the ascent; at the upper end of the couloir a long, thin rope was secured to a hook-shaped rock to assist in entering the couloir. The bergschrund was crossed with less difficulty than in the morning and shortly afterwards camp reached in safety. The day following a return was made to Glacier House, where they 'were received with a volley of questions, the answers to which were immediately cabled to the west and to the east.'

* When occupied in August, 1907, no cairn was to be seen, as if there was one it was so small as to be unnoticeable.

The Expedition to the South (Deville and Grand Glaciers).

Forces were now joined with Messrs. Topham and Forster, and together an expedition was organized to visit the southern glaciers. The train was taken to Bear Creek station, where a pack-horse was in waiting. On the back of this animal the outfit was duly loaded. The party now 'stumbled down over the slopes of the railway embankment with the horse, which growled like a bear,' and descended through the timbered slopes, littered by windfall, to Bear creek. The creek was crossed and the horse pulled over by a rope, and on the night of the 3rd August, camp was pitched on a sandy island in the stream.

Crossing Beaver river and Grizzly creek, an ascent was made to the Prairie hills* on the east side of the valley by a good path leading to a mine in the foot-hills, and good open travelling obtained along their open slopes. Here they progressed rapidly and easily, but were compelled 'only too soon' to turn down to the valley. Now, very slow progress was made, barely a mile being travelled in one day, and the horse had been left behind, for it was impossible to get him through the tangled forest. Travelling up the turbulent Beaver creek, which descends in numerous cascades, they were compelled to fell many trees to cross its swollen waters. However, on the 7th August, after a very hard day of work, they reached a swampy depression, some 38 kilometres (23¾ miles) up the valley from the confluence of Bear creek and Beaver river. 'To the right above it rose a wooded crest, behind which a rushing glacier brook flowed from the Grand glaciers.'

The following day, camp was advanced nearer the glacier, lugging their baggage through most abominable alder bushes. They now obtained a fine view of 'the magnificent icy landscape of the Grand glaciers. A broad stream of ice waved forth,

* Bald mountains is here meant.

from the background, and from the right, a really wonderful ice-fall sent its séracs into the depths.'

Some provisions had been left at the bridge they had built across the Beaver river, and it was now necessary to get them, so the entire party returned there. As there was little more than enough for two, Messrs. Sulzer and Forster decided to await there the coming of the two porters who had been sent back to the railway station for a fresh supply. Messrs. Huber and Topham crossed the river and ascended the steep slopes through the thick brush to the amphitheatre of the Deville glacier. 'Never before had I been on a more beautiful camping place. At the foot of a few large rocks, shaded by gigantic spruce trees, we beheld before us a green glacier lake; to the right, the great ice-fall of Deville glacier, and between two steep, lofty rock cliffs, keeping watch, as it were, we perceived the undulating, green prairie hills beyond the opening. Here Mr. Topham had camped several times, two weeks before, and had named the place "Glacier Circle."'

Crossing the Illecillewaet névé to Glacier House, a fresh supply of provisions was obtained. A Stony Indian, named Hector, was employed to assist in packing the supplies. He accompanied them to Glacier Circle and then returned. The Deville névé was now traversed and 'near 5 o'clock, we gained the upper rim of the magnificent ice-fall of the Grand glacier. This fracture, 1,200 to 1,500 metres wide, is precipitated like a mighty frozen waterfall down 600 metres (1,968 feet) upon the long waves of the other portion of the glacier, and flows out, between two high outposts, towards the Beaver valley.' Descending along the northern border of the séracs, 'now on ice, now on the rocks,' they reached the camp after stumbling for some hours in the dark. Mr. Forster and Sinclair, one of the porters, had returned, but Herr Sulzer and the other porter still remained at the bridge. Next day, Herr Huber, with Sinclair, went to the bridge for his large camera, which had been left there.

Accompanied by Yoes, the other porter, he returned to the camp at Grand glaciers, with a heavy load of provisions. Meantime, however, Herr Sulzer and Sinclair retraced their steps to Glacier House, with the intention of ascending some of the peaks of the Hermit range lying to the northwest.

First Ascent of Sugar Loaf and Beaver Glacier.

Early the following morning, an advance was made upon a peak chosen while crossing the Deville névé from Glacier House. The ascent is thus described: 'A moraine, snow, a "Firn" with a very difficult bergschrund, a rock-ridge and a snow-ridge were successively left behind, and at 10.30 we advanced upon the sugar-loaf-like peak which on that account received its name of "Sugar Loaf." Its height was not very great, some 3,150 metres (10,332 feet); however, it was predominant towards the southwest and east. The glaciers surrounding us presented an exceedingly interesting, wild and magnificent appearance. The most fascinating features of the view were the ice-fall of the Grand glaciers in the northeast; Mt. Purity in the northwest, rising from a wide foundation of glacier ice; at its foot, a deep valley, into which perhaps half a dozen glaciers sent their ice ruins to combine below into a majestic stream of ice. The horn of Mt. Beaver, which on this occasion received its name, rose in the south from the gap between the snow fields; also the trapezoidal wall of Mt. Duncan, decorated with a cross of snow. In the far east was the chain of the Rockies, peak on peak, range on range, vested in vapour (in the south and west), partly, perhaps, unknown, unnamed, traversed only by hunters and gold seekers, the whole veiled in the charms of an unexplored land.'

The next day, they set out separately, with the intention of meeting at the large glacier furnishing the initial source of Beaver river. About 5 o'clock p.m., Herr Huber arrived at 'a

gigantic glacier, which shot out into the open, spruce-abounding valley.' He estimates the altitude at 1,350 metres and distance, 'estimated like the rest of the distances, according to the map sketches of Rev. Green,' at some 45 kilometers (about 28 miles) from the junction of Bear creek with Beaver river. The glacier was recognized at once as the source of Beaver river, and he consequently named it 'Beaver glacier.'

Messrs. Topham and Forster missed the place of rendezvous and Herr Huber spent the night alone. He had a blanket and fire, but no provisions; the others had provisions, but no fire. They met in the early morning in time for breakfast. 'The glacier was crossed, its end marked, and it was found that when much water ran off, owing to melting, it had a second southern drainage which belonged to the drainage area of the Kootenay river.* The main flow is Beaver creek, belonging to the drainage area of the Upper Columbia.'

On the 17th August, the party crossed the Deville névé and, proceeding over the glacier pass south of Mts. Deville and Dawson, camped at the foot of the Donkin pass (that between Mts. Dawson and Donkin).

The First Ascent of Mt. Purity and the Donkin Pass.

On the 18th of August, Messrs. Huber and Topham made the first passage of the Donkin pass, descended by the Dawson glacier to Geikie glacier and ascended the opposite slopes to the Asulkan pass, reaching Glacier House by Asulkan creek. Having rested and obtained fresh supplies, accompanied by two Indians, they returned on the 20th by the same route, and on the 21st arrived at the camp, where Forster and the man Yeeloolead remained to bring over the remainder of their equipment from the Grand glaciers camp.

* The surplus channel flows to the headwaters of the Dennis river, the inlet of Dennis lake. The Dennis river has its source in a glacier beside Beaver glacier, but a little further south.

A descent was now made to the valley of a creek immediately east of Van Horne creek (a tributary of the Incomappleux river) and a camp pitched on the western slopes below Mt. Purity. The 22nd and 23rd, poured rain, and the ascent was not accomplished. Lack of provisions compelled a return to Glacier House, viâ the Donkin pass, on the 24th, where Yoos was discharged and the party remained until the 27th, when Messrs. Huber, Topham and Forster returned alone to the camp below the Dawson glacier, and the following day went over the Donkin pass to the camp below Mt. Purity. On the 29th, they succeeded in accomplishing the ascent.

'We left camp at 5.20 a.m., climbed over grassy mounds to a little glacier, arrived over the latter's steep slope at a terrace of the northern front peak of Mt. Purity and, over a heap of débris and some good rocks, reached the saddle at the foot of the ice-covered north ridge of the peak. Two hours of work brought us the hard-won victory. The scenery was exceedingly interesting. The peaks were essentially the same we had seen from Sugar Loaf, however with different configurations. . . . To the southwest a wide valley, likely that of the Lardo* river, opened. In the southeast we looked down into a beautiful glacier basin at our feet. There, a large number of stately glaciers flow together, hard by one point, and from a widely disrupted ice-stream. I took a nine leaved panorama, while Topham rond the angles. After having erected a stately "Stoinmann," we descended, at first over the stony northwest ridge, then crossed the perfectly smooth northwest flank of an ice-field, falling steeply some 700 metres (about 2,300 feet), to the saddle which we had ascended.' A return was made on the 30th August, crossing the Donkin pass for the fifth time. Glacier House was reached on the 31st, where Herr Sulzer was in waiting. A spell of bad weather now set in, which prevented further excursions during the time at their disposal.

* The Incomappleux (Fish) river, not the Lardo

First Ascent of Swiss Peak.

While the foregoing explorations and climbs were being made, Herr Sulzer was not idle. As will be remembered, he had remained behind 'to undertake the ascent of a peak which lay more north and which seemed to belong to the highest summits of the region.' An account of the ascent is found in his paper 'Mountain Tours in the Far West,' previously mentioned. Accompanied by a Canadian named Sinclair as porter, he set out on the 28th August with a full equipment and provisions for five days. The daily express train was taken to Rogers Pass station, three miles distant from Glacier House, on the east side of the summit. Here, the ascent was commenced. Herr Sulzer had examined the mass of which Swiss peak is one of the highest points, from Uto peak, with a view to an ascent. 'From this peak the mountain appears at a considerable distance, being framed by two summits which are lodged before it, Mt. Macdonald at the left and Mt. Tupper at its right.* Between these two peaks, in the deeply-indented Bear creek valley, lies Rogers pass. From this point it appeared uncertain to me which peak of the group might be the highest. I decided in favour of the centrally situated rock of the middle group and purposed to ascend it, either directly over the anterior wall, or by a circuitous way, over the northeast ridge. Analogous to the appellation "Rogers pass," I should like to term the group, which is the highest in the vicinity of the pass, and until now had no name, "Rogers Group," and the glacier lying before it, whose uppermost portion is visible in the sketch, "Rogers Glacier."†

* Here Sulzer is not quite correct here as regards the nomenclature. The two peaks on the left are those of Avalanche, while on the right appears Mt. Macdonell. Between them lies the respective summit of Mt. Rogers and Uto(?) Mt. The extreme summit only of Mt. Tupper shows behind Hermit Mt. as a background.

† For the reason referred to by Herr Sulzer, one might term a second point, "Uto(?) Peak" bounding the snow-field enclosed on the south, a second-

Bird's-eye View from Rogers Peak

They climbed up the steep slopes covered by brulé, opposite Rogers Pass station, and camped at timber-line. The following morning, leaving camp at 5.30 a.m., they proceeded for 1½ hours over steep grassy slopes and rock ridges to the foot of the glacier. Here, adjusting the rope, they took to the ice. The glacier was not found steep and was almost free from snow, having few crevasses. Another hour's travel took them to the 'Upper Plateau.' Here, arose the problem of what line of ascent to take. 'The precipitous slopes and smooth gullies suggested a direct ascent too difficult to attempt, and therefore, I resolved to climb entirely over to the right flank of the mountain and try the northeast ridge (see sketch).'

At half past 8 o'clock, Sulzer and his companion reached the foot of the rocks at a height of 2,500 metres (8,200 feet) and took a short rest. Higher up, the rocks were more precipitous and required greater caution. They were, however, hard and solid. A steep ice-slope now presented an obstacle, and finding it impossible to discover a passage on the exterior side of the ridge, for there 'a steep gully, covered with glassy ice, pointed its way into the yawning abyss below,' it was crossed by cutting 'deep steps into the blue ice, which was as hard as glass.' Some forty or fifty steps were required to reach the rocks beyond and consumed 'perhaps, a whole precious hour.' Keeping always to the south side of the ridge, no further difficulties of importance were encountered and at 1.50 p.m., they

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tated and now accompanies the report. On it are shown the routes taken by Herr Sulzer, that of the Topographical Survey, in 1893, and the route of Messrs. Abbot, Little and Thompson to the summit of Rogers peak in 1895. With regard to the names given as above, there are two glaciers descending from this snow-field: one tributary to the Beaver river, which I have called 'Upper Glacier,' and the other tributary to Bear creek, which latter was crossed by Herr Sulzer. This I have shown on the accompanying map as 'Swiss Glacier.' The name of Swiss could also be applied to the small snow-field spoken of by Herr Sulzer as the snow-plateau being between the Fox-tee nees and the lowest one feeding Rogers glacier, which has been given as Rogers peak. (See sketch.)

stepped upon the summit, consisting of 'loose layers of blocks and slabs.'

'The day was perfectly clear. As far as the eye could see, were innumerable mountain peaks all around. In the southern foreground, the ice-girded, central mass of the Selkirks with its northern marking stone, the bold, fascinating Sir Donald, appeared especially beautiful. In the east, beyond the lower Selkirk peaks, the long row of haughty Rockies lay spread in partly rounded, partly broken shapes—a scene which I shall never forget. Sharply outlined, dark rock masses interchanged with lofty snow-tops: all showed clearly and glistened in the furthest distance, where only fading, their faint outlines were lost in the horizon. The northern groups showed some particularly high peaks, Mt. Hooker and Mt. Brown, and immense snow and ice-fields. Stately mountain chains in the west completed the scope.'

Herr Sulzer estimated the height of the peak they were on as almost equal to that of Sir Donald. The most distant south-west peak of the mass (Rogers peak) appeared to him to be 15 to 20 metres higher. 'To reach it from our peak might be difficult: on the other hand, a direct ascent from the glacier presents scarcely any difficulties of import. I should like to designate that really highest peak of the group as "Rogers peak," and our rock peak, which is separated from the former by a very deep opening, as "Swiss Peak." The latter is now crowned by a solid "Steinmann," 2 metres high, as a token of ascent.'*

* The names given by Herr Sulzer now remain. Rogers peak is the highest, according to the determinations of the Topographical Survey, being 10,500 feet above sea-level. Swiss peak is determined at 10,215 feet. Between Swiss peak and Rogers peak are two other sharp points. And on the opposite side a short event, along the line of which Herr Sulzer ascended. The higher of the two former (10,071 feet) I have named 'Fleming peak,' and the lower (10,018 feet) 'Grant peak,' to commemorate the meeting of Sir Sandford Fleming, Principal Grant and Major Rogers at the summit of the peak below in 1887, prior to the advent of the railway. The latter could be named 'Swiss peaks' (10,018 feet).

The descent, always roped, was made by the snow couloir between Swiss peak and those referred to as Truda peaks. The centre of the ice-clad channel was avoided as much as possible, keeping to the rock along the sides. In less than two hours they stood at the foot of the mountain, the bergschrund having been crossed by Herr Sulzer by an 'involuntary slide and a bold jump at the right moment,' due to a tug on the rope by his companion. Camp was reached at 6.55 p.m., the ascent from the same and return, inclusive of halts, having taken eight hours and twenty minutes.* The day following, an expedition was made to a high point on the long range extending westerly from Mt. Tupper. The point is that from which the accompanying sketch of routes was photographed. It is exceptionally situated to command a view of the pass and its surroundings. While Herr Sulzer was sketching here, the clouds of an approaching electric storm enveloped him and he enjoyed a somewhat novel experience, which he thus describes: — 'Seated on the highest elevation, I began to sketch a portion of the view, while black thunderclouds sailed towards the ridge from the valley. Suddenly, two stone slabs next to me and standing opposite each other, began to make a humming noise, the metal holder of my sketching pencil buzzes and my pick begins to crackle strongly, especially when I grasp it. Simultaneously, a slight rain sets in and my fingers, also moistened by the rain, buzz. My companion is taken by a sudden fright and is incapable of uttering a sound. The cause of this phenomenon was clear to me at once, although I was not fully aware of the degree of danger which it might include. We were in an electric cloud. I remembered to have heard a few thunder reports,

* By making the direct ascent, the trip may be made from Glacier House in 12 hours, but will require an early start: the four miles walk along the track to the look at the old site of Rogers Pass station, which is the best place to ascend the burnt slopes to the basin below the glacier, and return along the same distance, may be made before and after daylight by using a lantern.

a short time before, issuing from the same cloud which had now reached us. The main volume of electricity stored up in it had escaped by lightning. The rest escaped when it reached the ridge, and to some extent, we ourselves involuntarily acted as conductors to the earth. A direct danger, therefore, was not present; for if the electric tension had still been great enough to generate lightning flashes, such would have been ejected before the clouds themselves touched the ridge. Nevertheless, the phenomenon was so strong that when I touched the pick on its metal mount, I felt a strong shock, and at night the play of sparks would undoubtedly have been visible.'

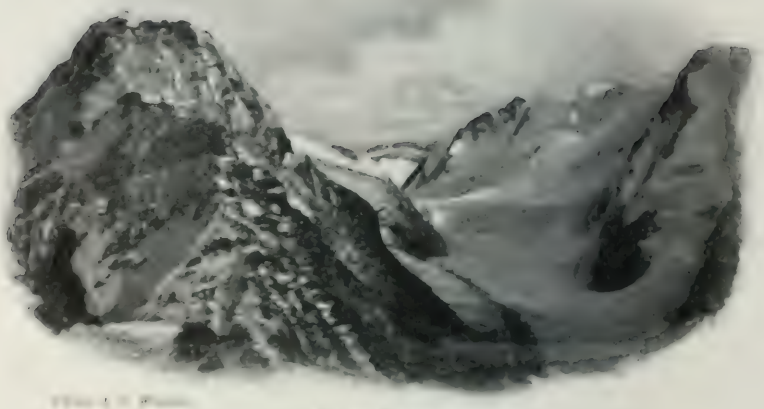
Rain and snow now set in and terminated all further exploration of this mountain group and on the 31st August a return was made to Glacier House, which was reached in a dripping condition. The next day, Messrs. Huber, Topham and Forster arrived and shortly afterwards the two Swiss gentlemen proceeded westward for the remaining portion of their trip.

In commenting upon his experiences, Herr Sulzer says, referring to this portion of the Selkirk range: 'It yet possesses in a full measure the charm of novelty, and only a few mountain tourists have from a few peaks looked upon the wide glacier lands in its interior. Most of our tours were, I admit, troublesome and laborious. He who takes notice of the fact that we pursued untrodden paths, that no maps, nor paths, nor trained guides, nor club-houses, nor any human habitation, aside from the railway line, can be found in these regions, will be able to conceive this. However, what we look for in the mountains is, indeed, not idle pleasure, but a thorough exercise for the muscles and the lungs, a good intelligence of nature and its agencies, as met with in these heights, a healthy body and a healthy soul.' Herr Huber remarks: 'Although many things afforded me great pleasure during the journey, still the tours in the Selkirks were the feature of my journeyings in the west.'

The above remarks of Herr Sulzer hold good to-day. In the vicinity of the Rogers pass no exploration has been extended beyond that outlined as above from Messrs. Huber, Sulzer and Topham's writings upon the subject and, in the part dealing with surveys, in the account of the Rev. W. S. Green's explorations. No new peaks of any consequence have been climbed; and yet, many are there in waiting. The real reason is found in lack of accessibility. Even at the present date, twelve years later, the only additional facilities consist of four short trails and two cabins, both unfinished. The trails are: one to the Asulkan glacier, one to Marion lake and Mt. Abbott, one to Avalanche crest and one to the foot of the Illecillowaet glacier. In some cases they extend short distances beyond the points named. These have been constructed by the railway company and are for the accommodation of its passengers who stop off for a day to get a passing glimpse of the Selkirk range. It is understood, however, that others have been commenced during the present season (1903).*

Matters will thus remain until a live Canadian Alpine Club is formed, with club houses at appropriate points, and an energetic executive to project expeditions, explore and construct trails and erect cabins with suitable equipment and, during the season, proper persons in charge. It seems strange, after so many years, that some such organization has not been accomplished, and unless it be that 'a prophet is not without honour except in his own country,' is difficult to account for. It speaks but poorly for the enterprise of Canadians that they must look to the works of other countries for a knowledge of their own mountains.

* A trail has been made to the Rogers amphitheatre, and a well-built cabin placed a short distance below. It was in use during 1904.



Mount Dawson

CHAPTER III.

THE APPALACHIAN CLUB OF BOSTON, U.S.A.

1899

IT was practically in the year 1899 that the Appalachian Mountain Club, with headquarters at Boston, U.S.A., first made its appearance in the Selkirks, although in previous years Mr. George Vaux, Jr., who is a member of that organization, had made snndry observations in connection with the movements of glaciers. The club was now represented by Professor Chas. E. Fay, of Tufts College, Massachusetts. With a pow-

Professor Cyrus F. Fay, President of the Asbestos Association

panion, he arrived at Glacier House, on his way eastward over the Canadian Pacific railway, two days after the departure of Messrs. Huber and Sulzer, and stopped over for a night. The only time at his disposal was that between 7.45 a.m. and 12.45 p.m., before the east bound express arrived. With this, ascending partly in the footsteps of Huber and Sulzer and partly on a new line of route, he clambered to the rock-crags rising directly from the snows surrounding the base of Mt. Sir Donald, to a point from which they rose sheer and further ascent, on that line, was impossible.

Prof. Fay was evidently much impressed by the possibilities spread out before him and, on his return, would seem to have laid them vigorously before his club, for, from 1893 on, most of the recorded expeditions and climbs are by members of the A.M.C., although none have assumed the proportions of those made by the Rev. W. S. Green, Harold W. Topham and Messrs. Huber and Sulzer.

1893.

While doubtless many passing visits were paid to the Selkirks during the years 1891 and 1892, there do not appear to be records of any special climbs. The year book of the Appalachian Mountain Club for 1893, contains an article written by the Rev. H. P. Nichols, read on October 11, entitled 'Back Ranges of the Selkirks.' It gives an account of an ascent of Mt. Fox by the gentleman named, accompanied by Prof. S. E. S. Allen and C. S. Thompson, via the Asulkan pass and Geikie glacier. It is assumed that the ascent was made the same year the article was written. This was the first ascent of magnitude made by a member of the club among the Selkirk peaks.

In opening his paper, Mr. Nichols remarks: 'We Americans have, hard at hand, without sea sickness, without great expense, a range of mountains rivalling the Alps, furnishing

all the cherished features of mountaineering, with peaks, not only unexhausted, but even unnamed and unseen. . . . From Glacier House, well-made paths already give easy access — as easy as heights to be surmounted, streams to be waded, boulders to be jumped, permit — to glaciers, snow-fields, ridges and peaks. . . . Green's failure on the master peak, Sir Donald, inciting the Swiss to its conquest, has been put side by side with Whymper's familiar story of the ascent of the Matterhorn: and there is a point on the lower summit of Cascade mountain* from which the view of Sir Donald exactly reproduces one of the most striking faces of the Matterhorn. The Hermit range at the head of the railway pass contains at least one mountain higher than Sir Donald, called by its intrepid climber "Swiss Peak."† Only this year, Cheops, a solitary point facing the station platform, has been conquered in one long day.'

Mr. Nichols' preliminary exercise was taken in a climb to Perley rock and a day after upon Mt. Abbott, from which point he first saw the Dawson range. 'The three peaks, each with its distinctive characteristic—Donkin, a sharp point; Dawson, a majestic mass; Fox, a gradually truncated cone—soared in brotherly grandeur between snow and ice and rocks and green rushing torrent. It was likest the Bernina Palu-Morteratsch range, as seen from Piz Languard in the Engadine, and that is likest the purity of heaven's imagined battlements and whiteness. . . . The management of Glacier House may well advertise Mt. Abbott as one of the chief attractions. Like the Eiger at Chamouni, the Gorner Grat at Zermatt and Piz Languard at Pontresina, it is so situated as to command a whole circumference of noble peaks. Though 7,600 feet high, it is but six hours' walk there and back, and one passes on the way

* Probably Avalanche crest is meant.

† The altitude of Sir Donald is 10,808 feet, and that of Swiss peak is 10,315 feet.

On the Arkansas Trail.

the beautiful Marion lake, nestled on the steep mountain side. A little cutting on a steep grass slope and on the face of the final ridge would make the route an easy one as well.'

It was decided to attempt Mt. Fox, one of the three peaks referred to, and on the 18th August, the party proceeded up Asulkan creek by the completed trail. 'The sound of rushing water is ever in one's ears. So is another sound, the strange cry of the whistling marmot—marmot calling to marmot across the shilt of some boulder-sheltered hole. . . . Where the slope was more level, wild grass abounded; we involuntarily listened for the tinkle of Alpine herds.'

Over the Asulkan glacier to the summit of the pass. 'Here the Dawson range burst on us in its near beauty. From this point Notman's famous photograph was taken. The other side is snowless—an awful drop of 2,500 feet to the Geikie glacier, which seems to lie as low and run as far as if it were at the very shores of the ocean. The slope is slippery grass, ploughed perfectly clean of even a nubble by spring avalanches. Nothing will stand on the mountain side, not even a man, unless propped by an ice-axe.'

They bivouacked at an old miner's cabin found under a ledge. At 5.30 a.m. on the 19th August, a cloudless day, a descent of 1,500 feet to the Geikie glacier, half a mile distant, was made in less than an hour. It took an hour and a half to cross the glacier, 'though on our return—under the impulse, shall I say of experience, or a thunder shower, or fear of a shelterless, supperless night?—we made it in twenty minutes.' Then followed 'the familiar forest ridge, moraine, log-patch, snow-slope, alpine flower garden—happy, healthy, upmoving' . . . . . It was 8.15, three and a half hours from camp, ere we attained the same elevation, 6,500 feet, as that from which we started. . . . Now began the work. . . . First, it was grassy slopes, conquered by zig-zagging. Then it was 1,500 feet of loose rubble and boulder, hazardous for the

climber, more hazardous for the man behind. Once a rock shot down past us, twenty tons in weight, attaining a velocity so tremendous as to bound a hundred feet at a jump. As we neared the upper crags, avalanches of stone and snow came thundering from the opposite cliffs of Dawson, perhaps one every five minutes—no danger for us, but a short, warning note in the air and a wonder to look at. The shelves of the crags were threateningly narrow and so were forced to make a detour on the rubble again. It was noon ere we reached the sunny breast. That crossed, the great dome itself loomed up before us. It was like the dome of Adams, but looked higher. It was higher. The aneroid showed our present height to be nine thousand feet. Our wildest guesses made the dome only five hundred feet more. When we stood at the top, the aneroid measured 10,200 feet.* That dome alone was 1,200 feet high, and it cost us an hour and a quarter, with twenty necessary rests. At 4.25 p.m. Mt. Fox was conquered. . . . We built our cairn on the highest point and ate our prunes and chocolate. There is a rocky crest some hundred rods away, across a dangerous snow-cornice and serrated ridge. It looked lower than our position and very difficult of access. If climbed at all, it must be from the other side. Since our climb, we have learned that the peak has been reached from the other side by the Illecillewaet party.† The return was made by the same route as the ascent and camp reached as darkness fell.'

In one chapter of his magnificently illustrated book 'Camping in the Canadian Rockies,' Mr. J. W. Wilcox, F.R.G.S., tells of his first visit to Glacier House, in 1894. Concerning it, he says: 'There is something preeminently comfortable and homelike about the Glacier House. The office is indefinable and one hardly knows whether the general style of an English

* The elevation of Mt. Fox, as determined by the Topographical survey, is 10,776 feet.

† H. W. Topham, 1899.

inn, or the genuine hospitality that one receives, is the chief cause. One always feels at home in this wild little spot and scarcely realizes that civilization is so far distant.

Any one who has visited the Selkirks for an extended period has, without doubt, spent many a day within doors writing his diary, or enjoying the pleasure of music or literature, while the rain is falling constantly, and the clouds and vapours hang low on the mountain sides. The manner in which the clouds come sweeping up the Illecillewaet valley at the base of Mount Cheops and turn towards the flank of Eagle peak or Mount Sir Donald is very impressive. Certainly, the cloud effects in the Selkirks are magnificent beyond all description.'

In 1893, Mr. Wilcox, accompanied by Professor S. E. S. Allen, made the first ascent of Eagle peak, and a little later that of Mount Cheops. Of the first climb he speaks in glowing terms: 'The view from the summit of Eagle peak is magnificent and well worth the labour of the climb. The proximity of Mount Sir Donald, which towers more than 1,200 feet higher, causes its sullen precipices to appear strikingly grand.'

Of Mount Cheops, he remarks: 'The view is fine, but not worth the labour of the climb, as the ascent of the lower slopes seems interminably long and tedious by reason of the underbrush and steep slope.'

With this opinion the writer is quite unable to agree. As already stated, the view from Mount Cheops, owing to the central position, sweeps the entire circle bounded by the Hermit, Sir Donald and Mount Bonney ranges, and commands the whole series of glaciers along their nigh faces, the glacial basin of Loop creek, the head of Cougar creek and for twenty-five miles the windings and twistings of the Illecillewaet river.

It is to be hoped that soon a pony trail will have been constructed up Bear creek and a cabin erected at the divide between that stream and Cougar creek. It will then be a simple and easy matter to reach the summit of the pyramid of Cheops in

less than two hours from such a cabin; and, as a view point, instead of deserving the reputation given it by Mr. Wilcox, due possibly to the difficulties of the road selected, it will be one of the most accessible peaks of the region and a delightful one-day trip from the hotel.

The same year, a party consisting of Mr. H. A. Perley, proprietor of the Glacier House; Mr. W. H. Rau, photographer, sent out by the Canadian Pacific Railway Company, and Miss Macleod, of Charlottetown, P.E.I., a guest at the hotel, together with two employees of the hotel, Herbert Lambert and William Stubbs, who acted as impromptu guides upon occasion, ascended to the crest of Mount Abbott. Here Mr. Rau set up a camera, for the first time, on Mt. Abbott, and took a series of views, sweeping the entire circuit, a panorama that may still be seen among the Canadian Pacific Railway Company's collection of views.

Continuing along the crest of Mt. Abbott, the party crossed the snow-field lying immediately west of its southern end and ascended a peak on the further side. As the first lady to make the ascent, Miss Macleod claimed the right to name the peak 'Mount Macleod.' Two years later, doubtless in ignorance of this fact, it was redistricted Mount Afton by Messrs. Abbott, Fay and Thompson, as referred to further on, which name was subsequently confirmed by a ruling of the Geographic Board.

1894.

In this year, Prof. Fay was again in the Selkirks, accompanied by Mr. Rest. F. Curtis, both members of the Appalachian mountain club. A good path had now been cut in zigzags up the slopes of Mt. Abbott as far as Marion lake. In an article in *Appalachia* for June, 1895, Mr. Curtis writes: "The weakest of those who go on our Saturday outings could easily make it in half a day from Glacier House, and have a couple of hours

to enjoy the lake itself and views of the valley and distant snow-covered mountains through a charming fringe of evergreens, which surround the water.' Among the few climbs then made was one to Mt. Abbott, of which a description by Mr. Curtis is found in the article referred to: 'Our crest grew narrower till at times one might be on both sides at once, and some care was necessary to avoid a start down the slope. Sometimes the ridge would take a sudden rise, which, when surmounted, would reveal still others to come, so that, indeed, it was difficult to say which was the actual summit. After nearly an hour of this delightful crest walk, taken in very leisurely fashion, we reached the southern end, stretched ourselves out on a small flat rock to moisten our lips from a pool, partake of a not unwelcome luncheon, and take in the view. . . . . The scene is not to be compared with any of our Appalachian mountain views at all, but it did recall a day spent on the Wengern-Alp near Grindelwald; and I do not exaggerate my impressions of the views of this region when I say that they will bear comparison well, day by day, with those of a short Swiss trip which I had the pleasure of taking a few years ago with Professor Allen of our club.'

On the present occasion Prof. Fay extended his climb to 'a nameless peak still farther on, and rising a few hundred feet higher, up which, on the side towards us, a steep snow-field swept nearly to the summit.'[1]

Their next scramble entailed the spending of a night on the crags of Eagle peak. The peak is so called from a prominent rock on its southern arête, which, from certain points of view, bears a striking resemblance to an eagle. One of the best of these points is from the upper portion of the path leading to Avalanche Crest. An account of the adventure, attractively written by Prof. Fay, appears in the same issue of *Appalachia*,

[1] This peak is now known as Mt. Afton, 8,875 feet.

under the heading of 'Our Bivouac on Eagle Peak.' The trip was inspired by a study of the pages of the year-book of the Swiss Alpine Club (Jahrbuch des Schweizer Alpenclub, XXVI, years 1890 and 1891) made at Glacier House the night previously, wherein is set forth the expeditions and journeyings of Herr Huber and Herr Sulzer, as already epitomised in these pages. Consequently, the following morning at 6.30 a.m., they set forth, and following the first scramble of Prof. Fay in this direction, made in 1890, again reached the precipitous crags of Sir Donald, referred to by him.

An attempt was now made to reach the rock façade up which Huber and Sulzer climbed to the arête below Green's peak (Terminal peak), but owing to the impassable rock-drops and broken, badly crevassed ice on the glacier resting on the south-west slopes of Sir Donald, the project had to be given up. Their steps were retraced and a traverse made across the steep-lying snows and hard névé below the towering crags of Uto peak. Crossing the red-rock ridge to the right of the elevation at its southern extremity, which stands out so prominently in the view from Mt. Abbott, they passed over the intervening snow-field and ascended the western face of the arête beyond, to a point within five hundred feet of the summit, where further progress was barred. Owing to the advance of night, they were unable to search for a possible passage to the summit, and immediately began to retrace their steps, only to be enveloped in darkness while still on the rock façade. Unable to advance further in the darkness, a halt was perforce made, and on a rocky shelf, sitting close together to preserve their warmth as much as possible the eight hours of darkness were passed. Prof. Fay portrays his experience in the following words:—'To describe the fascination of that superb night would require a masterhand. I can only schedule a few of its principal features. To the south and east, as far as the eye could reach, vast expanses of glacier and snow-field, out of which towered the mildly gleam-

ing phantom forms of Donkin, Dawson, Fox, Purity, and other nameless peaks. In the middle ground, the great Illecillewaet glacier—no longer a tremendous cascade of ice, but a broad river, we were so high above it. To its left, that great ridge which culminates in the pointed peak ascended by Green; and hanging high up on its hither side in the shadow, a lofty glacier from which, more than once, unseen masses, breaking off, fell with a crash to the depths below—this and the rush of water the sole sounds to break the moonlit silence. Finally, soaring high above the dark crags of "Uto" and the connecting ridge, the great obelisk itself, most like the Matterhorn from our position, all night long reflecting the moonbeams from new faces, as the low-riding orb passed over and beyond the meridian. Then the planets in turn—Mars, Jupiter, Venus.'

Six hours were spent the next day in finding the path by which to descend; meanwhile, two search parties had been sent out, one of which was communicated with on a distant height when on the way down.

Messrs. George and Wm. S. Vaux, Jr., were again at Glacier House for the purpose of continuing their observations of the Illecillewaet glacier.

1895.

This was an important year in the annals of Selkirk mountaineering, not on account of the climbs made, for only one new ascent was achieved and that a minor one, but for the advancement made in geographical nomenclature. Prof. Fay, who had rightly determined that the Selkirk mountains were well worthy of attention, was again to the fore, accompanied by P. S. Abbot and Charles S. Thompson, the former an enterprising and enthusiastic mountaineer of considerable experience, who, with the same companions, had just made the first ascent of Mt. Hector in the Rockies. He lost his life in the attempt to ascend Mt. Lefroy in August of the year following, 1896, upon which

occasion he was again accompanied by Prof. Fay and C. S. Thompson, also by Prof. Little.

On August 10th, the party left Glacier House at 9.25 a.m., ascended by the made path to Marion lake and thence up the right-hand side, through a tangle of fallen stones and dwarf spruce to the crest of the Abbott ridge. The ridge was followed to the high point where it turns westward and a snow-col connects it with the higher point climbed by Prof. Fay the year previously, and which, upon the present occasion was named 'Mt. Afton.'* This highest point of the Abbott ridge has been determined by the topographical survey at an altitude of 8,081 feet, and Mt. Afton at 8,423 feet. Avoiding the high point referred to, a descent was made to the snow-field between it and Afton, and the snow-slope on the northeast side of the latter climbed to the summit.

The view from the crest of the col, between the two points, disclosed a fine view of the eastern face of the ridge extending southerly to the Asulkan pass. 'From where we sat, the black, unassailable precipices of that portion of the ridge resembled in form and shape the face of a gigantic breastwork, a mighty "Rampart," over whose top towered the tent-like summit of Mt. Swanzy.† The crest seemed, as indeed we subsequently found it in many places, a sharp knife-edge.'

From the summit of Afton, a fine view was obtained of the western face of the ridge and the névé of the Lily glacier, ascended by Green in 1888. A number of points were now given names, all of which have been confirmed. The summit next succeeding Mt. Afton towards the south, from its bold, precipitous rock faces on the east, was christened 'Rampart' (8,476

* The name suggested by the first letter of the names of the gentlemen composing the party—Abbott, Fay, Thompson.

† The name 'Ramparts' here applied has been confirmed by the Geographic Board of Canada, as also the name 'Swanzy,' which was then given to the cutting peak between the ridge travelled and Mt. Bonney, in reference to the Rev. Henry Swanzy, Mr Green's companion during his survey of 1888.

Formation of the Antarctic Glacier—"Castor and Pollux."

feet), as above stated; the one immediately beyond, 'The Dome' (9,029 feet), a shape which it resembles from this point of view, although, seen from Mt. Cheops, it is an exceedingly sharp peak. Next in rotation came a separate mass, rising distinctly above the ridge. As seen from Mt. Afton, it presents twin peaks very similar in appearance. They were named Castor (9,108 feet) and Pollux (9,176 feet), after the twin sons of Jupiter and Leda, the name Castor being conferred upon the nearer or more northerly one. The nomenclature is somewhat unfortunate, for, seen from more easterly positions, a third point (9,133 feet), still farther to the south and belonging to the same mass, comes into view. The prefix 'Mt.' should not here be applied to the separate points, which are merely distinct elevations of the individual mass, as may be seen in the sketch from Mt. Avalanche hereto appended. The difficulty created may be overcome by naming the individual mass 'Jupiter Mountain' or 'Mt. Jove' and the third or southerly point 'Leda.' At the summit of Afton a cairn was erected, which is still visible and was used by the Topographical Survey throughout the season as a point of reference.

The route was now continued along the edge of the ridge to the summit of the Rampart, from whence a descent was made to the Lily névé. From the summit of the Lily col, they looked upon the southern watershed, 'a U-shaped snow field which fed a nameless glacier flowing into Fish creek valley' (Incomappleux river). The name of Swanzy glacier was suggested, after the peak around whose eastern base it flows.

It was now 5.20 p.m., but notwithstanding the late hour, an ascent was made of the northerly of the twins, 'Castor,' which had been the desired, though scarcely hoped for goal they had set out to reach. At 6.25 p.m., they stood upon the summit. Eight minutes were here spent. 'Turning to go, a last look fell upon Mt. Donkin; to my surprise, it barely equalled the

point on which we stood.'* The party now retraced their steps to the névé of the Swiftcurrent glacier and, following as nearly as possible, in a contour from the Lily col, rounded the southerly end of the ridge lying west of the Asulkan pass. A descent was made by one of the lateral glaciers to the Asulkan valley, which was reached after 9 p.m. 'in well-nigh impenetrable gloom.' The difficulties and dangers of an ascent of nearly a thousand feet over a glacier, when darkness had almost set in, can well be imagined. The trail in the valley was found after much hunting, but soon lost again. They then stumbled down the valley, in the darkness, not finding the trail until within a mile of Glacier House, which place was reached about midnight. (See *Appalachia*, January, 1896: 'Mt. Castor and the Asulkan Ridge' by Chas. S. Thompson.)

In addition to the foregoing, the ridge lying between the Illecillewaet glacier and the Asulkan valley was twice ascended by members of the Appalachian Club. Owing to its intermediate position between the Illecillewaet and Asulkan glaciers, it was given the name of 'Glacier Crest,' which name has been confirmed. It was the initial point of reconnaissance for both the Rev. W. S. Green and Messrs. Huber and Suizer, and is chiefly remarkable for the exceedingly fine view it commands of both the glaciers named and its easy accessibility from Glacier House. A good path, made by the railway company, leads to the summit. The path branches from the Asulkan trail, just after the first bridge over the creek is crossed. The second complete ascent of Eagle peak was also made by a new route. In addition, Messrs. Abbot, Fay and E. B. Field made an initial attempt on Rogers peak, but did not succeed in reaching the summit.

1896.

Under the auspices of the Appalachian mountain club, a party, consisting of Messrs. Philip S. Abbot, Chas. E. Fay,

* Castor is determined at 9,108 feet and Mt. Dawkins at 8,984 feet by the Topographical Survey.

Chas. S. Thompson and George T. Little, was organized in the spring of the above year for the purpose of exploring and taking scientific observations in the Rocky and Selkirk mountain ranges. In the Selkirks two ascents—both first ascents—were made.

First Ascent of Ross Peak.

On the 29th July, Charles S. Thompson and Professor Geo. T. Little climbed Ross peak, a mere preliminary to the more important business in hand. The forest was entered at the second of the Loop bridges and the ridge followed to the summit of the lower point known by the above name.

Loop creek discharges the flow from the melting snow and ice of the enormous glacier-filled basin of which the black escarpment of Mt. Bonney is the predominating feature. It is bounded by four distinct ridges and contains four distinct glaciers; on the east, by the long ridge of which Mt. Abbott, Mt. Afton, the Rampart, and the Dome form the most conspicuous summits; on the south, by Mt. Swanzy and its out-stretching arms; on the west, by the precipitous walls of Mt. Bonney; and on the south, by the serrated ridge of which Mt. Green is the pivot point at the western extremity, and Ross peak the outrider at the other end. Between Ross peak and Mt. Green are two high summits still unnamed. Within the recesses formed as above lie the Lily glacier to the east, the Bonney glacier, divided into two sections, and the glacier flowing from the angle, at the apex of which stands Mt. Green. To the last has been given the name of Green's glacier, in lieu of the one resting on the southwestern face of Sir Donald, upon which Green never set foot. The one that it is now suggested should bear his name, to ascended to the crest of the Bonney ridge. According to the determination of the trigonometrical survey, the altitude of

Ross peak is 7,718 feet, the intervening summits respectively 8,373 and 8,388 feet, and Mt. Green, 8,860 feet. The elevation determined by Messrs. Thompson and Little for Ross peak from aneroid barometer readings, carried from rail level at Glacier House, was 7,700 feet—not far from the truth. (For account of the climb, see *Appalachia*, July, 1897, Vol. VIII., No. III.)

On the 30th July, the real business began. The party consisted of Abbot, Thompson and Little. (Prof. Fay, owing to an indisposition, was unable to be of the number.) They started at 5.30 a.m. and ran down to the old site of Rogers Pass station, on a hand-car. The ascent was made along the west side of the stream discharging from the Rogers glacier. The climb to the amphitheatre below the glacier proved, apart from the usual impedimenta of the Selkirk timbered areas, to be an easy one, consisting of windfall and scrub, devil's club, etc., then green forest, and finally, burnt timber reaching to the rocks.*

At the foot of the glacier, they roped and, crossing it and the névé, climbed by a minor arête to the crest of the long black ridge extending so noticeably from Rogers peak in a southeasterly direction. The snow in the basin on the farther side of the ridge being too soft to travel over, the rocks along the crest had to be followed. In Professor Little's account of the ascent (*Appalachia*, July, 1897, Vol. VIII., No. III.), he remarks: 'We must keep to the rocks. The scree had disappeared. The boulders had grown larger and coalesced into ledges, tilted at unpleasant and varying angles. At least one place could be called difficult. The only thoroughfare was over a smooth ledge inclining at an angle of sixty degrees and nearly as many feet above the snow. There was no foothold save a transverse crack along its upper side, just beyond one's reach without the help of an ice axe or a friendly hand. . . .

* An easier ascent may be had by keeping more to the west at the start and then along the crest of the ridge up the east side of which the party apparently travelled.

Twice we crawled through or under great fragments of rock, which the giant hands of heat and cold had tumbled one upon another, rather than run the risk of surmounting or flanking them. . . . Three hours of such clambering brought us to the summit. . . . The sense of fatigue disappeared with the sight that greeted us. We had crossed the rock-rib that joins Rogers peak to Swiss peak and justifies Herr Sulzer's use of Mt. Rogers as an inclusive term, and were now standing on the snow that covers the crest of the mountain like a thick fold of flesh. Mr. Abbott called me to its northern edge, saying: "Look down and see what I have never seen before in Europe or America." The sight was a wall of snow at least fifteen hundred feet in height that seemed perpendicular, as we cautiously peered over. From its base a glacier swept away over an ice-fall, marked by huge irregular séracs, into the valley beyond.* To us, toiling for hours over the blackened rocks, this sudden transformation of the peak into pure, untrodden snow, rising from a foundation of glistening ice, was as startling as it was beautiful.'

Aneroid barometer readings placed the summit at 10,300 feet, and the clinometer showed a 1° angle of depression to

* A tributary to Mountain creek valley. In a foot-note Professor Little remarks: 'It will be found, I think, that we were over-looking the valley of Mountain creek. At any rate, the following day, as we crossed that stream, the fireman of the locomotive remarked: "Prospectors have been up that valley and have come out at Ross peak," apparently showing that there is an easy pass across the range, probably to the north and west of Cheops.'

It has already been stated in Part I., Chap. 3, that a pass was noticed by the Topographical Survey between the peaks now named 'Ursus Major' and 'Ursus Minor' (formerly Mts. Ray and Salter), leading from Ross creek near its head, to a tributary of Mountain creek. By traversing this pass from the opposite direction, crossing the divide and then descending the valley of Cougar creek, a traveller would strike the railway immediately opposite Ross peak. The main valley of Mountain creek, however, is much more far-reaching, and its headwaters must lie near those of Carnes and Downie creeks and may even extend to the vicinity of the headwaters of Gold creek, flowing westerly to the Columbia. From Swiss peak, Rogers pass, Mt. Cheops and other points of the Hermit range, the valley of Mountain creek presents many attractions for an exploration to its source and a return to the railway, via Cariboo creek or the north branch of the Illecillewaet river. From Swiss peak open meadows were seen, indicating that good trail may be obtained for pack-animals.

Swiss peak. The topographical survey has determined the altitude of Swiss peak—one of its trigonometrical stations—at 10,515 feet, computed from a number of angular readings to and from established points. Rogers peak is placed at 10,536. It is also a trigonometrical station, and the altitude has been computed similarly to Swiss peak.

The descent was now made by the snow-slopes along the eastern side of the prominent black ridge referred to above (see sketch of routes accompanying note of Herr Sulzer's ascent of Swiss peak). Other than a traverse to find a suitable spot, no difficulty was experienced with the bergschrund, which was crossed by a long step. The amphitheatre formed by the projecting ridges from Rogers and Swiss peaks was reached by 7 o'clock: 'The large crevasses that mark the turn and fall of Rogers glacier* into the valley were all well bridged. They were safely passed,' and a glissade of several hundred feet carried them to the foot of the steep slopes. By 10 o'clock they had crossed the amphitheatre above the edge of the woods: 'a second battle with this abominable piece of fallen timber, a brief lounge on the station platform, the long four miles on the railroad, and then came the welcome sight of Glacier House, just as the eastern sky was brightening into a new day.'

The same year, among the guests at Glacier House, were Dr. and Mrs. Stallard, of Menlo Park, San Mateo County, California. Their visit was chiefly remarkable in that Mrs. Stallard appears to have been the first lady to set foot upon the Asulkan glacier and to have climbed to the summit of the pass. 'In company with Mr. Perley, the proprietor of the hotel, and the gardener (Sam. Yowell) as guide, we started after 5 o'clock a.m.' Having tramped up the Asulkan valley, got wet through in the alder brush, the effects of a thunder storm the night

* This glacier is now designated as 'Deer Glacier,' the large one to the west, between Rogers and the next peak westerly, being named Rogers Glacier. This is a more appropriate arrangement for several reasons.

before, waded Asulkan creek and climbed a steep bank of slippery grass, they reached the margin of the glacier and took some rest and refreshment. 'We were now tied together with a long rope, in order to save any who might by possibility fall into a crevasse hidden by the snow which had fallen during the storm of the night before. This snow was soft and made our progress difficult; nevertheless, we worked our way upwards until stopped by a huge crevasse. It was forty feet wide and at least half a mile long. It was deep and its clear, blue walls overhung the chasm. We skirted the edge towards the west and coming round the end resumed the ascent to the divide now plainly seen in front of us. It was noon when we arrived at the summit, both tired and hungry. We set out our luncheon on a knoll of rocks near by and quaffed our champagne to the health of the first white lady who had climbed to this lovely spot to enjoy one of the most superb mountain views in the world.'

Dr. Stallard also climbed Mt. Abbott, which point of view 'presents a panorama more extensive and more sublime than any other on the Continent of America and can only be reckoned second to that of the Corner-grat in Switzerland.' He also recognized 'that the modest railroad hotel forms the centre of a mountain region which rivals the Alps of Switzerland in beauty, sublimity and grandeur.' (See Minute-book, Glacier House.)

1897.

In this year the Alpine Club was represented in the Selkirks and Rocky mountains by Professor John Norman Collie, Professor H. B. Dixon and Mr. George Percival Baker, and the Appalachian Club by Professors C. E. Fay, A. Michael and H. C. Parker, the Rev. C. L. Noyes and C. S. Thompson.

The former party brought with them the first Swiss guide taken into the country, in the person of the veteran Peter

Sarbach, from Zermatt. Joining forces, the chief attention was paid to the Rocky mountains and the biggest work done there in the accomplishment of the ascents of Mts. Victoria and Lefroy, upon the last of which poor Abbot had lost his life the previous year.

In the Selkirks, Glacier House was visited towards the end of July and a first ascent made of the Dome. The climb was accomplished from the Asulkan valley by way of the glacier below the peak. Castor and Pollux also—the latter a first ascent—were climbed from the Asulkan glacier. The route of ascent lay over the moraine which bears westerly from the Asulkan glacier, and then—as the party was forced by crevasses over to the base of the "mittelgrat" which descends between the Dome and the Rampart—under the base of the Dome to the "Col of the Emerald Pool."* From here to Castor the route of 1895 was taken. The passage across the col from Castor to Pollux offered no difficulty and was made in a leisurely way in thirty minutes. Pollux proved by the aneroid to be 5,971† feet above Glacier House and some sixty feet

* Probably the same as 'Sapphire Col,' a later name.

† The elevation above given for Pollux will doubtless be a misprint, and should have read '4,971 feet above Glacier House.' The altitude of Glacier House at that time was accepted as 4,120 feet (since corrected to 4,095 feet), which, added to the above elevation, 5,971 feet, would make Pollux 10,091 feet, or only 109 feet less than Mt. Bonney. According to the Topographical Survey, the mean of a number of determinations from fixed stations places Castor at 9,108 feet, Pollux 9,176 feet, and the third point of the mass, south of Pollux, at 9,159 feet. If, however, this was really the altitude obtained by the aneroid, assuming the readings were correct, it merely emphasizes the inaccuracy of that instrument, the results of which, without a stationary aneroid working in unison with the travelling one, to permit the elimination of atmospheric changes, are a mere approximation. Aneroids are universally very useful instruments for short distances, provided no lengthy period intervenes between the readings. They were used during the survey with great advantage to ascertain the difference of level between the railway base and the rivers flowing beside it at the valley bottoms, but for extended differences of elevation, without a stationary, they cannot be relied upon, and, even using a stationary, it is a matter of great difficulty to obtain two that work together, and constant checking and comparison is required.

higher than Castor.* . . . The party left Glacier House at 3.05 a.m. and arrived at the summit of Castor at 10.40 a.m." (*Appalachia*, March, 1898, Vol. VIII., No. IV.)

Dr. and Mrs. Stallard were again at Glacier House. Mr. George Vaux, Sr., Mr. George Vaux, Jr., and Miss Vaux, of Philadelphia, were also here during the summer. Messrs. George and William S. Vaux, Jr., and Miss Vaux have done good work in both the Rockies and the Selkirks. Their excellent photographs, some of which are now reproduced, and a number of monographs by the two gentlemen named, relating to their study of glacial action, and particularly of the Illecillewaet glacier, have attracted considerable attention. Further on will be found a short reference to the methods of their work in this direction.

Two other events of note occurred in 1897, viz.: A minute-book was opened at the hotel, in which an opportunity was afforded guests to record their expeditions, experiences and impressions, with the object in view of furnishing, not only a detailed record of the climbs made, but also the valuable information gained by their experience for the use of those coming after. A trail was made from Marion lake to Observation point on the face of Mt. Abbott, close by, from whence may be obtained one of the finest and most accessible views of the entire district. In this year also, the management of the hotel was assumed directly by the Canadian Pacific Railway Company, and Miss Mollison placed in charge.

1898.

The Appalachian Club was again strongly represented in the Canadian Rockies, but its work was chiefly confined to the

* With reference to the third elevation, before mentioned, it may be said that, when first named, the so-called twins were seen from the Allen end, at which point of view only the northern and central elevation of the mass were visible. Viewed from a more easterly point, the twins become triplets. A tracing from an enlarged photograph taken at the summit of Mt. Avalanche has been appended, which shows the mass in very nearly its true form.

divide of the main range, north of Laggan. Two parties were in operation—one consisting of the Rev. C. L. Noyes, C. S. Thompson, Rev. H. P. Nichols and George M. Wood; the other of Professor C. E. Fay, R. F. Curtis and another man, who joined them at Banff. Before closing the season, a visit was paid to Glacier House. While here, a trip was made to the summit of Glacier crest, along the western edge of the Illecillewaet névé and home by way of the Asulkan valley.

On turning to the minute book at Glacier House for the current year, several interesting visits and expressions of opinion are noted: Early in the season (June 30th), F. M. Beaumont, Vicar of Holy Trinity, Coventry, England, paid a short visit and remarks: 'An old member of the Alpine Club, I am familiar with the grandest mountains of Switzerland, Tyrol and Norway, but I have never seen finer mountain scenery than here.'

We also find an entry by B. S. Comstock, of New York, the American gentleman who attempted Mt. Sir Donald the day before it was ascended by Messrs. Huber and Sulzer. He writes: 'In July, 1890, I came out to Donald and there engaged, as my companion, the most celebrated bear hunter of the region, who had spent the first fourteen years of his life as an Arab of the London streets.* This early experience in the sharpening of his wits had evidently not unfitted him for woodcraft. In getting through intricate forests, I have never seen his equal. He came with me to Rogers Pass station one afternoon, whence we ascended to the top of the tree line and camped out in our sleeping-bags. The next morning we climbed the rounded, dome-like snow-slope which forms the N. E. extremity of Hermit ledge.' An attempt was next made to ascend Mt. Sir Donald by the valley to the left as you face the mountain from Glacier station. They reached the foot of the cliffs: 'At this

* Harry Cooper, who accompanied Huber and Sulzer in their ascent of Mt. Sir Donald

The Hermit Range and Summit of Eocene Peak

point one discovers, when he reaches the very cliffs, to the left of Sir Donald, that a stratum runs from the top of the cliff (or what may be termed the gum) down to the base of the cliff, at a very gentle angle. This stratum projects about 18 inches and forms an easy path of ascent to the north or left base of Sir Donald. We then ascended the tooth for about 800 feet. At this point my bear hunter gave out and we were obliged of course to descend. It is certain that the summit will never be reached by way of this ledge.'

He also, in the year under discussion, with friends, climbed Mt. Abbott and visited 'what may be termed the ledge of Eagle peak, at the head of Cascade valley. I consider the view from this point superior to that from Mt. Abbott. . . . This view is certainly superior to the one from Piz Languard in the Engadine. One feature of this valley which does not exist in a like degree among the Alps, is the forest of great pines.'

An entry in the minute book is as follows:—'On the north-east platform, opposite the dining-room windows, will be found two lines of tacks radiating from a common point. The left-hand line represents the true meridian and has an arrow mark and the letter "N" at the end. This line was obtained by observation. The right-hand line represents the magnetic meridian as it existed August 13th, 1898, the variation being 24 degrees, 45 minutes.

'WILLIAM S. VAUX, JR.,

'8th Mo. 21st, 1898.

Mr. Vaux's extremely practical action in placing this valuable information in a prominent place, where it cannot but be available for the correction of observed magnetic bearings, is much to be commended. As the result of a number of observations taken in 1901 for meridian, chiefly at Rogers pass summit, the variation was found to be 24 degrees, 55 minutes to the east, *i.e.*, the magnetic needle swings that amount east of true north.

This year, also, Mr. W. S. Vaux continued his observations in connection with glaciers.

An article appears in the minute book, written by Mr. George Vaux, Jr., containing an excellent programme for a week's visit to Glacier House and giving some useful hints as to the best route by which to reach the points of greatest interest in the immediate vicinity. Visitors are recommended to read this article before mapping out their programme. It will be found among the items for 1898. Among the points of interest mentioned are: The Illecillewaet glacier, one mile and a half distant; time required to reach it, 45 minutes. Then, Marion lake, and Observation point close by; Mt. Abbott, as part of the same trip is specially recommended. Up the Cascade trail to Avalanche Crest—a full day is recommended in this case. Another full day is required for a trip up the Asulkan valley to the Asulkan pass; from which point of vantage a splendid view is obtained of the Dawson range. The seven falls and the Alpine meadows of the Asulkan valley are specially pointed out. Glacier Crest, lying between the Illecillewaet and Asulkan glaciers, is worthy of attention as providing a near and magnificent view of two immense glacier formations. The article finally ends with the following advice to photographers:—'Take care and do not *over-expose*; the light is wonderfully actinic.' Mr. Vaux is an amateur photographer of much skill and has done some clever work in the Selkirks. His advice is good and should be carefully borne in mind.

In 1898, the first mention in the minute book is made of Dr. and Mrs. Charles Schaffer, although they had been annual visitors for some years previous, first arriving when Mr. Perley was in charge of the hotel at Glacier. Mrs. Schaffer is a clever photographer and has kindly contributed several fine views for reproduction with this report. In particular may be mentioned a three-leaved panorama of Sir Donald and the Illecillewaet glacier, a grizzly killed by Sam Voss, who was with Heiber,

Topham and Forster, and a number of studies of Selkirk flora, fish and game. Both Dr. and Mrs. Schaffer have shown deep interest in the Selkirks from a natural history point of view and have contributed largely towards records in this direction.

Hugh E. M. Stutfield made the ascent of Eagle peak alone, the 'guide' being unwell. He gives the following directions for the climb:—'Ascend to the top of the second cascade [a trail might with advantage be cut to this point], follow the stream up the valley to small glacier at the head of the latter. Turn to left up rock and stone slopes, follow long straight couloir up to final rocks. Bear slightly to the left, and an easy but amusing scramble takes you to the summit. . . . The ascent should take 5-6 hours. . . . A lantern should be always taken. It seems a pity that more facilities are not afforded to would be climbers in this delightful district.

'If more trails were cut and competent guides for rock and ice work were obtainable, Glacier House would soon be a popular centre for mountain excursions. I would also suggest that the C.P.R. authorities should provide a big telescope with stand, etc., of the type familiar in Alpine hotels.'

The railway company is always open to good suggestions and promptly avails itself of any such. The following year, Swiss guides made their appearance at Glacier House, brought thither by the enterprise of the company. The telescope appeared shortly after. Trails, however, although in better condition, are not much further advanced in this vicinity at the present date. It is probable that much will be done during the present year (1903), as a number, opening up fresh points of interest, have been planned.

In 1898, a minute book for the record of 'Scientific observations' was opened and has since been contributed to in a praiseworthy manner.

At the Head of Asulkan Creek

Photo H. W. Gleason.

THE GUIDE HASLER.

CHAPTER IV.

SUBSEQUENT TO THE INTRODUCTION OF SWISS GUIDES.

1899.

THE above year was marked by the advent at Glacier of two properly accredited Swiss guides, Edouard Feuz and Christian Häsler, of Interlaken. They were trained men, belonging to the corps of guides holding certificate under the Swiss Government, who have served an apprenticeship, passing by various stages from porters to guides, and who are obliged to renew yearly their letters of authorization from their Government. The introduction of these men practically consti-

tuted a new era and climbing became far more general and no longer a monopoly of those who claimed membership in some alpine or mountaineering club.

Chief among the climbs worthy of record are the second ascent of Mt. Sir Donald and the first ascent of Mt. Dawson.

Ascent of Mt. Sir Donald by Green's (Terminal) Peak.

The former was made by M. F. Leprince-Ringuet, Ingénieur au Corps des Mines de France, accompanied by M. Heinrich Cordes, attaché to the German Embassy at Pekin, and the guides Christian Häsler and Edouard Feuz. A new route, that by way of Green's peak (Terminal peak) was taken. The party left the hotel at 3 a.m. on the 26th July and followed the beaten path to the Illecillewaet glacier, then, leaving to the left the torrent coming from the base of Sir Donald, they ascended the moraine. Now, keeping the séracs of the Great glacier on the right and the rocky steeps of the Perley rock to the left, the spurs of which compelled some climbing, they ascended to the névé, having had to cut steps over one icy declivity. The grand névé of the Illecillewaet at a height of 2,740 m. (8,999 feet) was reached at 7.30 a.m. From there the view is very fine and comparable to those which one sees in the neighbourhood of Zermatt as one reaches the Italian frontier.' (See M. Leprince-Ringuet's account of his ascent, Minute book, Glacier House, 1899.)

Now, following in the footsteps of the Rev. W. S. Green, the party travelled northwards over a steep snow-slope, followed by some rocks, and reached the summit of Green's (Terminal) peak, 2,930 m. (9,610 feet). Here they were separated from the great mass of Sir Donald by an abyss 'absolutely perpendicular, followed by a sharp crest about 50 m. above us.' However, the experienced eyes of the guides perceived several possible passages, of which the shortest to the arête joining Green's peak to Sir Donald summit was taken. Using the rope,

Heads of the Illecillewaet Glacier.

with Feuz leading, they skirted the vertical wall of the peak on the left and descended slowly by a little chimney to the arête. 'In the vicinity of the snow-slope which descended from the col, the passage over the loose micaceous schist was particularly difficult and at times dangerous.' After an hour and a half of this work they set foot on the main peak of Sir Donald. They now attempted to ascend by a cliff between two strata, but were stopped by a bed of ice which covered it. A second stratum, a little lower down, which pointed outwards, seemed practicable. Attached to the second rope held as firmly as possible in a position in which there was little comfort, Feuz tried to get a foothold there, but after several metres of dangerous work, he was obliged to return. 'We were a little demoralized, but the guides did not lose courage.' Partly by the rocks and partly by the snow, they worked their way to a stony slope much lower down, and were soon able to set foot on a comfortable space near a cascade.

A couloir, where from time to time volleys of stones fell, now confronted them, and again they tried to ascend straight up, avoiding the couloir. 'Trouble lost! It is necessary to make up our minds to cross it twice. "Forward! Forward!" cries Hasler and we pass as quickly as possible over the snow, strewn with stones, and over the rounded points of a wall of rock where the water falls in a cascade. Finally, after this dangerous passage, the climbing becomes a little easier over some débris and snow-slopes. We reach the line of the southern summit or prolongation of Green's peak.' From here on the work was easy and at 3.35 p.m., the summit was reached, on the same day of the same month, just nine years after the first ascent by Huber and Sulzer. M. Leprince-Ringuet puts the altitude at 3,200 m. (10,496 feet).

At the summit they perceived the cairn and in a bottle found the document placed on the 26th July, 1890.

The view is described as 'a tempest of snow peaks. Some quiet notes, as the long rectilinear valley of the Spillimacheen

stretches away towards the southeast, and that of the Beaver crowned with plateaus, like the Alps of Switzerland. Behind, the chain of the Rockies, whose one distinguished Mt. Assiniboine (E. 28° S.), the "Three Sisters," several extremely sharp peaks, then the great glaciers of the Lyell and of the Columbia, the last mountain forming an enormous mass in the distance (N. 13° O.), and in the two quadrants towards the Pacific and the United States, a chaos of unknown mountains.'

At 4.25 p.m., the descent was commenced and a return made by practically the same road as the ascent. At 8.20 p.m., they regained the névé of the Illecillewaet glacier. They now finally leave the rocks 'where we have been for eleven and a half hours, and, with the exception of about two hours' rest, have not been able to keep our eyes off our feet, or our hands off our ice-axes.' By 9 o'clock the foot of the moraine at the edge of the Sir Donald torrent was reached and, by the light of a lantern, a painful tramp through the underbrush and rocks along the torrent followed. At 11.15 p.m., the party arrived at the hotel after a day's work of more than 20 hours.

M. Cordes adds the following tribute to his companion:—'We arrived on the arête extending from Sir Donald, at 12.15. Everybody proposed to give up the ascension and return by the easiest way. It was only through M. Leprince-Ringuet's energy and splendid dexterity, combined with the effect of a splendid breakfast, that we succeeded in getting any further at all.'

First Ascent of Mt. Dawson.

The second ascent of importance in 1899 was that of Mt. Dawson, the giant of the Selkirks, by Professor Chas. E. Fay and Professor Herschel C. Parker, of Columbia University, accompanied by the two Swiss guides, Christian Häsler and Edouard Feuz, on the 13th day of August.

They left Glacier House on Saturday, 12th, at 12.40 p.m., and, ascending the Asulkan pass, descended the steep slopes

on the opposite or southern side; then, crossing the Geikie glacier, they camped on the wooded slope, at a point over 400 feet above it, close by the great moraine of the Dawson glacier. Starting next morning at 3.55 a.m., the upper end of the moraine was reached at 4.50, an elevation of 1,280 feet above the starting point. Beyond the moraine, the névé in the great amphitheatre was ascended to the rock-wall joining Mts. Dawson and Fox. It was estimated at 600 feet high at the lowest part.*

The rock-wall was climbed to the crest of the arête. 'To reach it had required some of the most tedious climbing of the day, as the rocks were bad and covered by a moist, sliding, disintegrated shale. Fully one hour and a half was spent in making these six hundred feet.' (See Minute book, Glacier House, 1899.) The arête, which was found easy, was followed to the upper snows and reached at 9.25, at an altitude of 4,450 feet above the camp. 'From here on, it was a superb snow climb, at first with gentle ascent, then more steep, till, coming under the rocks that form the easterly end of the final peak, the snow swept up at an angle of 45° to 60°, broken by one broad schrund, around which we had to pass. The passage from snow to rock had to be made with great caution. The last few hundred (lateral) feet were over rock, alternating with short snow arêtes. The summit was reached at 10.45 and appeared to have a probable altitude of 10,800 feet.† The crest of the mass is composed of two distinct elevations, perhaps one-third of a mile apart. That upon which they now stood was named by them Hasler peak, and the one next to the westward, a few feet less in height, was named Fenz peak,‡ in honour of the two guides, who had then made their first virgin ascent in the Selkirks.

* This rock-wall was found by the Topographical Survey to be 800 feet high at the point where it is ascended.

† The greatest altitude of Mt. Dawson has been determined by the Topographical Survey at 11,115 feet.

‡ Greatest altitude, 10,980 feet. Distant from highest point of Hasler peak 1,800 feet.

'The day had not improved as we advanced. Low drifting vapours were weaving and panting about the vast array of alpine summits, that on a clear day would form an incomparable alpine panorama from this exalted view-point. We enjoyed what magnificence the clouds would permit, and their own grand spectacle.' To the summit of Mt. Bonney a considerable angle of depression was observed. The summit of Mt. Fox had long been overlooked. Mt. Deville was seen to be easily attainable from the line of ascent and continued to out-tower Fox by some hundreds of feet.

A 'stoneman' was built by the guides and the records of the climb corked up in a bottle and placed in one of its recesses. The return was made by the same road as the ascent and the hotel reached at 8.45 p.m. on the 13th. (A most vivid and picturesque account of the ascent, written by Professor Fay, appears in *Appalachia*. April, 1904. Vol. IX., Nos. III., IV.) In the Minute book, Professor Parker adds the following note:—'The climb up the 600 feet of rock wall from the Dawson névé to the arête, the traverse of this splendid arête and final narrow and broken summit ridge, draped by treacherous cornices and snow arêtes, required on the part of the guides the display of coolness and skill of the very highest order.'

Among the minor climbs of the year was an ascent of Eagle peak, on July 19th, by Professor Henry G. Bryant, President of the Geographical Society of Philadelphia, and Mr. L. J. Steele, of London, England, accompanied by the guides Hasler and Feuz. The ascent was the usual one by the Cascade trail to the basin at its head, then over the ridge into the valley lying directly to the east and up the snow-slopes of the couloir, intersecting the southerly face of the peak, to the summit. Referring to the view from the small glacier at the head of the couloir, Mr. Steele says: 'The actual summit of Eagle peak is not yet visible, but from this point the whole mass of Mt. Sir Donald is most impressive and bears a remarkable resemblance to the Matterhorn, with the Uto peak at its base as a substitute for

the Hornli.' The descent was made by the northwest ridge of the mountain to the snow-field lying between Eagle peak and Mt. Avalanche. 'The descent down this hitherto unattempted and unknown route proved to be an experience both thrilling and bristling with difficulties. The precipitous nature of the face, with its loose rocks and shale, and the unknown difficulties before us necessitated the utmost coolness and care from each member of the party' (Minute-book, Glacier House, 1899.)

On the 21st July, M. Leprince-Ringuet, accompanied by a guide, ascended Mt. Avalanche, and on 24th July, Eagle peak. These climbs were preliminaries to his ascent of Mt. Sir Donald on the 26th.

On the 28th July, Dr. Rudolfrich von Meran, accompanied by Edouard Feuz, ascended Mt. Avalanche from the southwest and descended by the eastern arête. He describes it as a most entertaining and highly rewarded climb, without any difficulties.

August 5th, Eagle peak was ascended by way of the south-eastern arête by Professor C. E. Fay and the guide Feuz. Up to a certain point the route was that traversed by Messrs. Fay and Curtis in 1894, previously described. The results showed that it would have been impossible to reach the summit by the path they then took, the way being obstructed by a difficult buttress, to avoid which a considerable deflection had to be made in the present instance.

George and William S. Vaux, Jr., of Philadelphia, continued their interesting and scientific investigations of the movements of the Illecillewaet glacier. Owing to its being an exceptionally cool season, the recession of the snout of the glacier was found to have been only 16 feet. Mr. George Vaux remarks, in an entry in the Minute-book on the subject, that 'the most striking change in the whole district is the unusually large amount of snow yet remaining in the mountains. This is partly due to the abnormal snowfall of last winter—54 *feet* on the level at Glacier House—and partly to the cool summer.'

Colonel E. Holser, of Salem, Oregon, a guest at Glacier House, enters a note in the Minute-book as follows:—'The work done by several artists, whose pictures in oil and water-colours were shown us, proves that this is a region surprisingly rich in material for study from the artist's standpoint. The works of two Toronto artists, Messrs. Martin and Bell-Smith, both members of the Canadian Academy, are especially commendable to the public. These gentlemen, spending weeks in the mountains, are doing for the Selkirks what Bierstadt did for the Sierra Nevadas. This is the most satisfactory resort for the artist, the photographer, the lover of nature, the seeker for the grand and beautiful. On no other transcontinental railway can be found crowded together such an aggregation of scenic grandeur. The glacier after which this station is named lies at its very doors. The river born from its ice-clad portals flows at our feet. An arctic equipment is not required to become familiar with the elemental ploughshare that has prepared this globe for the habitation of man.'

The trail from Marion lake up the east slopes of Mt. Abbott was extended for some distance and it was now possible to make the trip to the crest easily in three hours.

1899.

Four Swiss guides were detailed for Glacier House at the opening of the above season, Karl Schlunegger and Friedrich Michel having been added to the number. The other two were Edouard Feuz and Jacob Müller. The latter had replaced Christian Häsler, who had been transferred to Mt. Stephen House, in the Rockies.

The pioneer work was again done by the Appalachian Club and two new first ascents were added to their list, viz.:—Mt. Swanzy and the peak lying immediately west of Rogers peak. The latter was ascended under the impression that it was Mt. Grizzly. It has been found, however, that the same more appro-

priately belongs to the next mass to the west and, the matter having been submitted to the Geographic Board, the application of the name to the latter mountain is confirmed. It is now suggested that the peak lying between Mt. Grizzly and Rogers peak be named Mt. Sifton, after the Honourable the Minister of the Interior, within whose portfolio the administration of the district lies.

In other respects, it was a gala year. No less than four ascents were made of Mt. Sir Donald. The first for the season, and third ascent of the peak, by George Vaux, Jr., A.M.C., is worthy of special note, in that a new route to the summit was mapped out and followed. It has remained the popular route with very slight variations up to the present date. On the accompanying sketch the several lines of the first three ascents are shown as nearly as it has been found possible to interpret their description from the accounts given. A brief sketch of Mr. Vaux's ascent is as follows:—The party left Glacier House at 2.40 a.m. on the morning of July 11th, the Swiss guides, Edouard Feuz and Karl Schlunneggar, in attendance. They proceeded rapidly up the trail to the Illecillewaet glacier and across to the foot of the small glacier coming down from the southerly face of Sir Donald,* reaching the first of the rocks at an elevation of 9,000, shortly before 8 a.m. Much difficulty was experienced in finding a practicable crossing of the bergschrund at the base of the rocks: 'Finally, after an hour's delay, a feasible route was discovered, involving, however, a very dangerous traverse across a nearly perpendicular snow-field, which fell away below us into the yawning cavern of the great crevasse, lined with icicles as white teeth.' (Minute book, Glacier House, 1900).

* This glacier was originally, for some unknown reason, named Grizzly glacier. It has been found more appropriate to apply the name to the one more intimately connected with Mt. Grizzly. It is here suggested that the name of 'Vaux glacier' be here applied.

The party now zig-zagged up the rock-face, in full view of Glacier House, a little to the right of the most westerly couloir seen in the sketch. The trough of the couloir was traversed at one point where there was considerable danger from stones falling from the cliffs above. The arête was reached at 11 a.m., a little above the perpendicular drop seen in the sketch—referred to by M. Leprince-Ringuet as the continuation of Green's peak. Following the arête carefully, avoiding the 'fine, icicle-lined snow cornices, the actual summit was reached at 12.35 p.m.' Here they found the 'stoneman' left by the previous climber, and added their record to those already deposited.

Their barometer recorded the height of the summit at 10,175 feet.* 'Our elevation was thus shown as nearly *500 feet lower than former observers, though this is not to be strictly depended upon, as the barometer had been acting somewhat erratically.*'

The descent was commenced at 1.25 p.m. Almost immediately an electric storm broke in all its fury: 'sleet, rain, hail and granular snow fell in great quantities. The wind rushed violently, now up, now down, now across our path. The whole mountain was strongly electrified, and each shrill crack of thunder would be preceded by a sharp buzzing from the points of our ice-axes.' At 2.35 p.m., the place where the arête had been gained was reached: 'The wet condition of the rocks, the falling stones and ice, loosened by the rain and wind, made extreme caution necessary. Once we stopped and rested for about 15 minutes under an overhanging crag, which protected us from the fusilade from above. The storm now abated and we could see the sun shining. Finally, after a most careful traverse of the vertical snow-field above the bergschrund, where we all went with our "faces to the wall," the snow being very treacherous, we safely reached the névé again at 5.15 p.m.' Glacier House was reached at 7.15 p.m. 'Notwithstanding

* By Trans-Siberian Survey determinations 4,788 feet.

Ice Cave, Illecillewaet Glacier.

the difficulties, there was not a moment when the guides did not appear to be perfectly at home and familiar with their duties. Their skill and knowledge of their craft is unsurpassed.'

August 14th, Sir Donald was ascended for the fourth time, by J. Henry Scattergood, of Philadelphia, also a member of the Appalachian mountain club. The route was the same as followed by Mr. Vaux. Glacier House was left at 3.15 a.m., and the summit reached at 10.05 a.m. 'The great bergschrund and overhanging mass of snow described by Mr. Vaux were there, apparently unchanged. This mass of snow had been pierced, by some happy chance for climbers, by a great natural upright tunnel, through which a course could be made to its top side, where the dangerous traverse had to be made.'

The altitude at the summit was registered by the barometer at 10,740 feet. 'This is 90 feet higher than the usually tabulated height of Sir Donald, but, inasmuch as the instrument was carefully adjusted and in perfect order, *and, further, that there was no variation due to the weather during the day*, I am inclined to think it is very nearly the correct height.'*

The descent was commenced at 10.40 a.m. and Glacier House reached at 3.15 p.m.; in all, twelve hours. This appears to have been the record trip in so far as times are concerned.

September 11th, the fifth ascent of Mt. Sir Donald was made jointly by two parties: one, the Rev. James Outram—who, during the summer, succeeded in making the first ascent of Mt. Assiniboine, the Canadian Matterhorn—his brother and the guide, Karl Schlunneggar; the other, Mr. G. C. Butler and the guide, Edouard Feuz.

Mr. Outram describes the ascent as consisting of one difficulty and three possible dangers, the difficulty being the crossing of the bergschrund. With regard to the other, he says:

* Mr. Scattergood's altitude of 10,740 is the nearest recorded to that of 10,808, obtained by the Topographical Survey from a series of trigonometrical levels.

'To sum up: The dangers, at most, are of extremely small importance: avalanching with three on a rope of decent length would nowhere do any harm on Sir Donald, as the snow patches are not extensive; iced rocks are of no real account; falling stones are a very off chance, even by the stock route. The main line is otherwise extremely obvious and excessively easy, broad ledges to saunter on and simple rocks are the staple product of the face climb, simple rocks and continued and easy snow, at a good angle, from the point where the arête is struck to the summit. Variations *ad lib.* to taste can be made along the whole route and several interesting major deviations would, I believe, be of advantage in many ways to the energetic and experienced rock climber.'

Of the view he writes: 'The view from the summit of Sir Donald is stupendous. We were favoured with an absolutely cloudless day and, owing to the late date, no heat-daze spoilt the clearness of detail and sharpness of outline. For immense area of mountain country and number of snow-peaks, I doubt whether there is panorama equal to it in any part of the globe. . . . Single mountains, such as Columbia and Forbes, Dawson and Bonney, with lesser giants, strike the eye and linger in the memory, but the ineffaceable effect, the characteristic feature of the view, is the vastness of this world of mountain-tops and glacier-fields, the mighty majesty of creation and the Creator of the infinite whole of which this vastness is but a tiny part.' (Minute-book, Glacier House, 1900.)

The sixth ascent of Sir Donald was made on the 12th September, by Hugh E. M. Stutfield, of London, England, who had visited Glacier House in 1898. He was now accompanied by the guides Jacob Muller and Friedrich Michel. A start was made at 3.10 a.m. The party arrived at the summit at 9 o'clock. The short time taken for the ascent—five hours and fifty minutes—was due to the fact that steps cut by the parties ascending the day previous saved them much time and labour.

About an hour was spent at the summit and the hotel reached again at 2 p.m.

First Ascent of Mt. Sifton.

(Noted in the Minute-book as Rogers Peak.)

This mountain is the one lying immediately to the west of Rogers peak. It was ascended by Professor Arthur Michael on the 3rd September, accompanied by the guides Edouard Feuz and Friedrich Michel. The party probably ascended to timber-line very much by the route previously taken by Abbot, Thompson and Little in 1896. 'We spent the preceding night by the creek that runs between the glaciers coming from the Swiss and Rogers peaks and just above timber-line.' The following morning, after reaching the glacier, it was crossed diagonally to where the 'long stone arête' comes down to the ice. This ridge was followed to the summit, partly on one side, partly on the other, sometimes on the rock and sometimes on the snow. 'The snow arête, a few feet behind the stone peak, was the actual summit at the time.' The ascent from the camp ground took $3\frac{3}{4}$ hours; the descent to the same point, $2\frac{1}{2}$ hours. Professor Michael remarks: 'This climb is interesting and presents no special difficulty. We did it during a snow and hail storm, but the view from the summit during fine weather must be superb. The sunset, seen from a point to the left of our sleeping place, was as fine as any I have ever seen in Switzerland.' (Minute-book, Glacier House, 1900.)*

* There is a slight discrepancy in the account of this ascent as recorded in the Minute-book and in *Appalachia*, April, 1901. In the former the account is headed 'Rogers peak (Hermit Range), Sept. 3rd, 1902.' In the latter it appears in the report on exploration as 'First Ascent of Mt. Grizzly.' It is probable that the discrepancy has arisen owing to an uncertainty which existed with regard to the proper name of this peak, some calling it 'Rogers Peak,' others 'Mt. Grizzly.' This uncertainty has resulted in giving the name of Mt Grizzly upon the peak lying next to the west, which was also a claimant for the name, and, from its immediate proximity to Rogers peak, rightly so. In order to set at rest all doubt as to which peak was actually climbed, the guide Edouard Feuz was communicated with and a reply received, stating that it was the one immediately to the west of Mt. Rogers, and which is now named Mt. Sifton. Mt. Rogers is the mass connecting Swiss peak, Rogers peak, etc.

The First Ascent of Mt. Swanzy.

This was made on the 6th of September by Professor Arthur Michael and Sydney Spenser, accompanied by the guides Edouard Feuz and F. Michel. The party started at 3.45 a.m., ascended to Mt. Abbott and walked along the Rampart; thence, skirting the mountain side to the little glacier, ascended to the snow-saddle between the Dome and Swanzy peak (Lily col). From here, they ascended by snow and rock to the rock-cap, where a detour had to be made to reach the summit,* at which point they arrived at 12.10 p.m. The party then crossed over below the Dome to the Asulkan glacier and returned home by way of the Asulkan valley. 'This peak may be recommended for the splendid panorama seen from its summit and the imposing view of the great face of Mt. Bonney' (Minute-book, Glacier House, 1900.)

In addition to the ascents enumerated, the following climbs were made by J. Henry Scattergood, of Philadelphia, for which he gives the times and altitudes stated:—August 6th, Green's peak, altitude 9,600.† Left Glacier House at 7 a.m.; arrived at summit at 12. The climb is described as easier than Eagle peak, but more difficult than Mt. Avalanche.

August 7th, Mt. Avalanche, altitude 9,350 feet.‡ Left Glacier House at 6.45 a.m.; arrived at summit at 12. Is described as the easiest of all the ascents he mentions here.

August 10th and 11th, the Asulkan pass and Fish creek valley; altitude of the pass where the cairns are, 7,650 feet.§ Left Glacier House at 12.30 p.m. with the guides Jacob Müller and Friedrich Michel and reached Asulkan hut in two hours, summit of pass at 4 p.m. The trip was made with the intention of ascending Mt. Fox, but bad weather compelled a return the

* Altitude by Topographical Survey 9,887 feet.
† Altitude by Topographical Survey 9,775 feet.
‡ Altitude by Topographical Survey 9,385 feet.
§ By Topographical Survey 7,576 feet to lower part of pass.

next day. From the summit of the pass, two fine mountain goats were espied. The party descended to the Geikie glacier, crossed it and camped at a spot 800 feet above the ice of the Geikie glacier and quite near the Dawson moraine. 'Here excellent water, much fire wood and good boughs can be found.' The camp was reached at 6.15 p.m. Mr. Scattergood recommends the spot as the site for a permanent hut to furnish a starting point for mountain ascents in the locality.

August 13th, Eagle peak, altitude 9,250* Left Glacier House at 9.15 a.m. by the Cascade trail, which had recently been improved and lengthened to where it crosses the stream at the third log bridge; then to the right through the woods and on, to the crest of the great rock ridge, which was followed to the summit, arriving there at 2.30 p.m. The ascent is described as the most difficult of the three peaks named.

Doubtless many other minor climbs were made during the season, but there does not appear to be a record of them. While of great general interest, they appeal rather to the lover of nature and picturesque scenery than to the mountaineer, whose chief enjoyment is the exhilaration of overcoming the difficulties and dangers of the loftiest summits. He risks his life and bends his energies to each conquest for the sake of the attendant novelty, excitement and comparison with other conquests that it affords.

* By Topographical Survey, 9,253 feet.

E. Evelyn Berens.

CHAPTER V.

LADY MOUNTAINEERS IN THE SELKIRKS.

1901.

THE year 1901 was not without its remarkable series of events. Indeed, it was a record year in one respect, viz.:—Three ascents of magnitude were, for the first time, made by ladies. Mt. Abbott, Glacier crest, Avalanche crest, and other minor points had several times been reached with the assistance of the mountain paths made to near their summits by the railway company. Now, however, two attempts were

made upon Mt. Sir Donald, one of which was successful. A successful ascent was also made of Eagle peak.

In addition, there are records of the second ascent of Mt. Dawson, the second ascent of Swiss peak, the first and second ascents of Mt. Grizzly proper, and three other ascents of Mt. Sir Donald.

Second Ascent of Mt. Dawson.

The second ascent of Mt. Dawson (Häsler peak) was made by B. S. Comstock, of New York, on the 16th July. He was accompanied by the guides Edouard Feuz and Friedrich Michel. They left the hotel on the 15th and, crossing the Asulkan pass, descended to the Geikie glacier. They camped for the night in the spruce timber, a few hundred feet above the ice, at the spot previously used for that purpose.

The next morning, the party left camp at 3.20 a.m., and followed the lateral moraine of the Dawson glacier, close by camp, to the névé above. The névé was now followed nearly to the bottom of the couloir descending from the Mt. Dawson arête. Here it was necessary to make a diversion to the rocks on the left, which were climbed for several hundred feet, and thon, by way of the couloir, to the saddle between the summit of Mt. Dawson and a subsidiary buttress on the left.*

The main arête was now followed to the summit. 'From the saddle, special caution was required in our case, because of the snow-cornice which extended the whole length of the arête. The peak has properly two summits, the further or western one, about 100 feet beyond the nearer one, the two connected by a narrow arête. The western summit we were the first to attain. . . . The nearer of the two summits was ascended last year, I believe, by Professor Fay, who has described it in detail

* The route was probably the same as that followed by Professors Fay and Parker in 1899.

in a recent number of *Appalachia* (Minute book, Glacier House, 1901.)*

Mr. Comstock's barometer made the altitude of this point 11,100 feet.† Camp was left at 3.20 a.m. and the summit reached at 10.10 a.m.; the summit left at 10.20 a.m. and camp reached at 2 p.m. The short stay was due to a severe snow-squall, which obliged an immediate descent. 'The wind blew very fiercely, almost threatening our safe balance upon the arête, and the driving snow-needles cut our faces painfully. . . . The view from the summit is undoubtedly quite as fine as from Sir Donald, or any other of the Selkirk summits, and, rising as it does from such an amphitheatre of its own wonderful group, as seen from the Asulkan pass, this peak seems to me to be the most beautiful of any in the immediate region.'

The first attempt on Sir Donald by a lady was made by Mrs. Florence Gough, registering from Ottawa, Ontario. The guides Edouard Feuz and Charles Clarke, who had replaced Jacob Müller, were in attendance. They left Glacier House at 3 a.m. on the morning of the 7th June. The weather was not very promising and before reaching the moraine of the small glacier on the face of Sir Donald, it began to snow. All went well, but slowly, until the bergschrund was reached. The rocks being full of snow and ice, every step had to be cut, rendering progress tedious as well as dangerous. The storm had got much worse. By 1 p.m. the overhanging rock at the head of the couloir, where danger from falling rock is incurred on the present line of ascent, was reached. Here it was seen that further progress was out of the question, if it was not desired to spend a night on

* It is not quite apparent what is meant here. The highest or eastern peak of Dawson (Hasler peak) was ascended by Professors Fay and Parker in 1899. Their names were found on a flask, set up a cairn, by the Topographical Survey in 1902. The western rock (Dana peak) is 1,856 feet distant, not 100 feet as stated by Mr. Comstock. The route joining them would present a very difficult and dangerous climb.

† The Topographical Survey makes the altitude of Hasler peak 11,018 feet.

Mount Sir Donald in Midwinter.

the mountain, so it was decided to return, and after some difficulty, Glacier House was reached at 7.45 p.m.

First Ascent of Sir Donald by a Lady.

On August 3rd, 1901, Mr. and Mrs. Berens, of St. Mary's Crag, Kent, England, left Glacier House at 3.15 a.m., accompanied by the guides Karl Schlunneggar and Charles Clarke. Neither had done any previous mountain climbing other than on Mr. Berens' part, a climb to the summit of Mt. Avalanche and, on that of his wife, to Avalanche crest, the Asulkan pass and the fossil beds of Mt. Stephen. Mrs. Berens rode a pony to the end of the trail, where the steep ascent begins. The route taken was the usual one, since the third ascent by Mr. George Vaux, and no difficulty was experienced, beyond a few slips, which were promptly checked by the rope. The summit was gained at 11.30 a.m. and flash-light signals exchanged with the tower at the hotel. Some photographs were taken, and a small cross of stones erected at the summit. The return was made without mishap, except a dive on Mrs. Berens' part into the bergschrund stopped at once by the rope. The conditions of both mountain and weather were perfect.

Of the ascent, Mrs. Berens writes in the Minute-book: 'When we first got on the rocks, I asked the guides, how long it would take us to reach the top? Their reply was: "Oh! four or five hours." I thought to myself, "What nonsense! I am sure we can easily get there in an hour or so." Alas! my conceit was very quickly taken out of me, as I found that it was not such an easy climb as it looked. Be wise, friends, and never despise a mountain; it always gets the best of you in the end. I looked down once and after that carefully avoided it, as the valley of snow and ice below looked as far (as we were concerned) away as Piccadilly or Chestnut street, and to look up seemed almost as bad. In climbing, always look for next

foothold, and nothing more, as, if you look down, it is apt to frighten you, and if up, you get discouraged.'

Had Mrs. Berens spent her life in climbing mountains, instead of being a perfect novice, she could not have given better or truer advice. A photograph of the plucky little English-woman, taken by Mrs. Charles Schäffer, is here reproduced.

The eighth recorded ascent of Mt. Sir Donald was made on August 16th, with the assistance of the guides Edouard Feuz and Karl Schlunegger, by Leonard K. Walbridge, of Philadelphia. The party left Glacier House at 2.50 a.m. and arrived at the summit at 9.30 a.m. The bergschrund was difficult to cross, owing to melting from the continued fine weather. 'Sir Donald being in its best condition, the bergschrund was in its worst. The snow had melted. The old crossings were destroyed. A mile down the glaciers, where the gentler slope began, were huge blocks of snow, which had broken away from the bergschrund within the past week of fine weather,* since Mr. and Mrs. Berens made the ascent. As a result, we went a long distance to one side, where the rock was far steeper than at any other place. After a time we found our way down and across.'

The descent was commenced at 10.50 a.m. and Glacier House reached at 4.20 p.m.

The ninth ascent of Mt. Sir Donald was made on August 24th by Messrs. Barrett Wendell, Jr., and John Paton, assisted by the guides Charles Clarke and Friedrich Michel. The party left Glacier House at 3.30 a.m.; arrived at the summit at 11.40 a.m.; left the summit at 1 p.m. and arrived at Glacier House at 7.30 p.m.

First Ascent of Mt. Grizzly

On the 31st August, the mountain upon which the above name has recently been conferred by the Geographic Board of

* The season who is found out for the Selkirks might make without a drop of rain. A short spell of snow and sun in October was again followed by [illegible]

Mrs. E. E. Ehrens, of St. Marys Ohio, Kent, Ltd.

Canada, was ascended by Dr. Aug. Eggers, of Grand Forks, Dakota, and the Rev. Dr. John Bushnell, of Minneapolis, accompanied by the guides Karl Schlunegger and Friedrich Michel. The mountain is easily recognizable by its square, massive appearance at the head of the vista, as you gaze up the pass from Glacier House. Its elongated crest, rising in elevation at either end, and grizzled appearance render it especially conspicuous.

Glacier House was left soon after 3 a.m. and the summit reached at 11.45 a.m. The railway was followed to Rogers Pass station, and then the right bank of Bear creek. The mistake, however, was made of crossing the creek too soon and striking into the heavy tangle of undergrowth that here chokes the mountain side. By keeping along the right bank of the stream until the first open space is reached, a natural staircase, in the shape of the stony bed of a torrent coming directly from the summit, is soon perceived. Following this, alpine slopes and easy rocks lead to the summit.

Dr. Eggers refers to having seen traces of bears while making the ascent, nor is this surprising, for of all places in the Selkirks, Bear creek, near its head, is most frequented by them, and their paths through the tangle along the creek, and dens in caves below the isolated rock masses, peculiar to this valley, may readily be seen; much more so, however, than the animals themselves, who, as a general rule, give intruders of the human species a very wide berth.

While the climb to the summit of Mt. Grizzly is an easy one day expedition from Glacier House, and could readily be made more so by a trail up the creek, it is well worth the exertion. The view from the summit, of what lies beyond the Hermit range, is superb, and the glorious panorama opens up new vistas and new fields, little dreamed of when within the limits of which the Hermit range forms the north circumference.

Drs. Eggers and Bushnell were good enough to build (by request) at the summit an imposing 'stoneman' (rock cairn), which was subsequently used as a point of reference by the Topographical Survey. Its altitude, as determined, is 9,061 feet.

August 31st, the tenth ascent of Mt. Sir Donald was made by the Topographical Survey. On this occasion a flagpole was carried up and placed in the centre of a substantial rock cairn. The cairn was built midway between the actual summit and the point from which Glacier House is visible. It was 80 feet distant from the summit and 40 feet lower. Four hours were spent there. The guides Edouard Feuz and Charles Clarke took charge of the party.*

September 7th, Swiss peak was ascended for the second time on record, by the Topographical Survey, accompanied by Edouard Feuz. The rock cairn, six feet high, placed by Herr Carl Sulzer, was found to be still intact and had already done good service to the survey party. Three hours were spent at the summit. An account of this climb and that of Sir Donald will be found in Part I., Chap. 2.

First Ascent of Eagle Peak by a Lady.

The entry in the Minute-book at Glacier House is as follows:—'Together with the guide Edouard Feuz, I had the pleasure of ascending Mount Eagle on Wednesday, Sept. 18th. We started at seven o'clock, went up the trail, through a little brush and up by the arête. We arrived on the summit at five minutes to twelve. We made the return journey in four hours by the valley between Eagle and Green† mountains, a somewhat

* The following spring, no signs were to be seen of either flagpole or cairn, nor had any previously built cairns been seen at the time the Survey party was there.

† Probably this name is a confusion of the so-called Green's peak and glacier on Mt. Sir Donald.

fatiguing way, since at this time of the year there is not much snow, but long stretches of rock and stone. The views from Eagle are most magnificent, and I counted 102 glaciers. This was the first ascent made this season, and it was the first time any woman had gone up. What difficulties there were were reduced to a minimum by the skill and care of the excellent guide.

'HENRIETTA L. TIZO.

'Warlingham, England.'

1902.

The above year showed a steady advance in the number of visitors to Glacier House and in the interest taken in the climbs, scenery and attractive expeditions provided by the various paths and pony trails. It was chiefly remarkable for the increased interest and enterprise of ladies as mountaineers, and also for the demand for ponies to reach the various points of most attraction. Two first ascents were made in the vicinity of Glacier House, viz.:—Mt. Macoun and Mt. Cougar; also, by a lady, the second ascent of Mt. Afton. In addition, were made the second recorded ascent of Mt. Cheops and three ascents of Mt. Sir Donald, one of them the second ascent by a lady.

On July 7th, Mts. Abbott and Afton (8,423 feet) were ascended by Geo. F. Archer and Miss Kate Archer, of New York. This constituted the second ascent by a lady. On July 9th, the southern spur of Sir Donald was ascended by the same party.

On July 21st, the eleventh ascent of Mt. Sir Donald was made by Irving Langmuir, of New York. 'On the summit we found in a bottle the following record:—"Hugh E. M. Stutfield, A.C., with Jacob Müller and Friedrich Michel, 12th Sept., 1900. Top, 9 a.m.; 5 hours and 50 minutes from hotel."'

On July 30th, Mts. Abbott and Afton were ascended by Mr. and Mrs. Wm. E. Mead, Middletown, Conn.—the third ascent of Mt. Afton by a lady.

The twelfth ascent of Mt. Sir Donald was made, August 4th or 5th, by M. Biddle and two gentlemen (no names given).

First Ascent of Mt. Macoun.

August 14th, the Rev. J. C. Herdman, of Calgary, Alberta, made the first ascent of Mt. Macoun (9,988 feet, Topographical Survey). Dr. Herdman was accompanied by the guide Edouard Feuz. The trip was made in 13 hours. They left the hotel at 5.20 a.m. and followed the path to Sir Donald, then, branching to the right, followed a faint path to a rock-slide from the south shoulder of Sir Donald, and thence climbed to Perley rock. They left Perley rock at 8.10 a.m. and crossed the Illecillewaet névé above, travelling parallel to the course of the Beaver river valley, a distance of six or seven miles, to the base of Mt. Macoun. The base was reached at 10.30 a.m. They now ascended the rocks on the northwest side, arriving at the top at 12.15 p.m. "There was no evidence on the summit that the mountain had ever before been climbed, so we built a "stone-man" and placed our names on record, in his keeping. The day was fine, but distant horizons were obscured by haze. There was a fire and much smoke in Fish creek valley. A little lake nestled at the foot of Mt. Fox. To the northeast of that mountain, some other lakes were visible in the fine placid valley* parallel to the Beaver river and on the other side of it to the northeast. That the sweep of views was most inspiring goes without saying. It embraced ice and snow-fields, lakes and rivers, the cirque of peaks around Glacier House and whole wide-spread valleys and parallel mountain sub-ranges, with the

*Valley of the north branch of Sullivan river.

sharp-pointed peaks of the main range of the Rockies closing off the outlook all along the horizon to the northeast and north.' They left the summit at 12.45 p.m. and arrived at Glacier House at 6.10 p.m., varying the route a little on the return journey.

Second Ascent of Mt. Sir Donald by a Lady.

August 27th, Miss Marion Raymond, of Boston, Mass., accompanied by the guides Edouard Feuz and Friedrich Michel, left Glacier House at 4.10 a.m. and took breakfast at the usual place at the base of the rocks. Shortly before reaching the arête it began to snow and at the summit of the mountain snow and cloud were so thick that it was impossible to see more than a few feet in any direction. Only a five minutes' stay was made at the top. While descending the arête, the storm, which had somewhat abated, came on again in all its fury, now accompanied by violent wind. A stop was made under the shelter of the overhanging cliff, but in half an hour it was much the same and so very cold they were forced to keep on. 'Our descent from here to the glacier was long and hard. The rocks were mostly covered with a thin coat of ice and the wind blew the snow in thick sheets, making it impossible to see any distance ahead. We had to pick our way down and across the glacier quite carefully, but from the left moraine everything was easy and we reached the hotel by seven.'

Too much cannot be said in praise of this exceedingly plucky Boston girl, who, in the face of a bad storm, refused to forego the triumph she had set out to win. That the storm was a bad one the writer can testify, for he, with a party, crossed the Asulkan pass while it was raging. If bad on the Asulkan pass and south slopes descending from it, how much more severe would it be near the summit of Mt. Sir Donald. Again, considering that the lady was steadily climbing, with but two short

half hour rests, from four o'clock in the morning until seven o'clock at night, it may be considered a feat of the greatest pluck and endurance.

On September 13th, accompanied by the guide Edouard Feur, Mr. F. E. Weiss and Mrs. E. S. Weiss made the ascent of Cougar mountain. Though not very exalted (7,882 feet, by the Topographical Survey), this is a novel climb and presents some difficulty. It was the first ascent of the peak on record, at least by the route followed.

The party left Glacier House at 6.20 a.m. They followed the railway track to the water-tank at the mouth of Cougar creek. Thence, through the scrub and bush, keeping near the stream, to the main south ridge, just below the pyramidal face of rock that forms such a prominent feature in the eastern view of the mountain. As this rock-face presented much difficulty and some danger, it was decided not to ascend by it, but to make a detour to a more northerly ridge, by which the summit was easily attained. It was reached at 2.30 p.m. and a stone-man (cairn) erected. The aneroid recorded 3,900 feet above Glacier House: 'The mountain offers, however, no particularly interesting features to the climber, nor is the view from the top as good as that from Mt. Avalanche. Nevertheless, the mountain and valley may offer points of interest to visitors to the Selkirks. All over the mountains we found tracks of mountain goats and while proceeding up the ridge, we started a large goat, which trotted off over the steep slabs which had turned us back. The cascade half-way up the valley would also be quite worth a visit, if a trail of some sort could be established through the bush.' (Minute-book, Glacier House, 1902).

The following notes by Mr. H. W. Gleason, of Boston, are of interest:—

'Eagle Crest.—By this is meant the long sloping ridge leading from Eagle peak in the direction of the hotel. It is easily reached by a steep climb along the edge of the "bush" to the

THE UPPER GORGE—ALASKA CANYON

right of the "meadow" above the Cascade. Aside from other notable views, it gives an absolutely complete view of the Great glacier from "top to toe" without the least obstruction—a peculiarity of no other view-point, so far as the writer is aware.

'Albert Canyon.—A trip to this locality may be hardly said to come within a list of climbs (the usual conveyance being "a pusher" down in the morning and a return freight in the afternoon), yet, whoever visits the canyon and attempts to reach the level of the stream, thereby gaining some of the most impressive views, will find ample demand for all his climbing ability and coolness of nerve. The upper portion of the canyon (reached by a detour through the forest), with its dark overhanging precipices, its roaring waterfall and boiling torrent, its immense "well holes" and cavernous recesses worn in the solid rock, is the most *awful* place which the writer has yet seen in the mountains.'

Among the climbs of the year, those made by the Topographical Survey party may legitimately be numbered. Of the higher ones, the following are worthy of note:—Rogers peak, the two at the head of Cougar creek on the north side (named respectively Mt. Bagheera and Catamount peak), Ursus Major (formerly Mt. Roy), Mt. Swanzy, the south peak of Mt. Bonney (Clarkes peak), Castor and Pollux, Mt. Fox, Mt. Dawson (Häsler peak), Mt. Selwyn (formerly Mt. Deville), Mt. Donkin, Mt. Purity, High peak on west side of Deville névé (Mt. Wheeler), and Beaver Overlook, as well as a number of other minor peaks. A description of these climbs is found in Part I, chapter 3.

A sad note, among the happy records of the year, was the death of 'Fritz.' Only a dog! And yet with more right to the word 'mountaineer' than many who lay claim to it. He was killed on the north side of the Geikie glacier by a fall of 700 feet. In his two summers of experience in the Selkirks, he had climbed many peaks; among them: Swiss peak, Rogers peak,

the two high peaks at the head of Cougar creek, Mounts Roy, Avalanche, Grizzly, Cheops, Abbot, Cartier, Mackenzie and many others. He was a general favourite and well known in the Selkirks. In the minute-book at Glacier House, a kind friend has entered a tribute to his memory.

"Fritz"

1903.

Few climbs worthy of record were accomplished. The season was an exceptionally wet one and the opportunities for work limited.

July 19th, Allston Burr, of Boston, made the ascent of Mount Sir Donald, accompanied by the guides Edouard Feuz and Friedrich Michel.

The party left the hotel at 3.44 a.m., and arrived at the summit at 10.53 a.m. The return was commenced at 11.27 a.m. and the hotel reached at 3.30 p.m. The usual route was followed.

July 28th, the Rev. Dr. Herdman, of Calgary, Alberta, accompanied by the guides Edouard Feuz, senior, and Edouard Feuz, junior, made the ascent of Mount Macdonald.

They proceeded on the evening of the 27th, to the old site of Rogers Pass station, where they camped for the night. The climb was commenced next morning at 3 a.m., the ascent being made by the deep couloir opposite their camp, leading to the north-western arête. The arête was reached at 8.15 a.m., but it was found too precipitous to continue to the summit by this route. Consequently, the party descended a considerable distance on the south side and made a zig-zag traverse to avoid some steep outcropping cliffs. Two snow slopes were crossed and a third ascended to a crest, from which an easy arête led to the final peak. The summit was gained at 12 o'clock.

Here was found a small cairn of stones with a piece of wood placed upright in the centre. In a large rock, close by, was a hole filled with water, and at the bottom of the hole a rusty nail. No names or inscription were found. These evidences of a previous ascent caused much disappointment to the party, as the expedition had been planned with the intention of making a first ascent.

The descent was accomplished by way of the col between Mounts Macdonald and Avalanche, and thence to Rogers pass. Leaving the summit at 1 p.m., Glacier House was reached at 8 p.m.

September 1st, two parties of four each made the ascent of Mount Sir Donald by the customary route. W. Douglas and Rev. W. F. Baily, with guides Christian Bohren and Charles Streiff, composed one party; J. H. Batchellor and W. Meakin, with the two Edouard Feuz, father and son, as guides, composed the other party. A start was effected at 4 a.m. and the summit reached at 11 a.m.

First Ascent of Mount Sir Donald by North Arête.

September 3rd. This was the most important ascent of the season. E. Towes, of Bremen, Germany, assisted by the guides, Edouard Feuz and Christian Bohren, left the hotel at 4.30 a.m.

and climbed to the arête between Uto peak and Mount Sir Donald, where they arrived at 8 a.m. Here the party roped and began to climb the lowest part of the Sir Donald arête, which was found very steep and partially overhanging. In consequence, they were compelled to traverse up and down, until the upper arête was gained. Immediately below the summit, a belt of vertical plates made the arête impassable and another traverse around the face was necessary to find a passage over the vertical plates.

The summit was reached at 4.10 p.m., involving eight hours' continuous climbing. The descent was made by the ordinary route and the hotel regained at 9 p.m. The weather was fine but the condition of the rocks, which were covered with fresh snow and ice, was as bad as possible.

Herr Towes adds the following note to his account of the climb :—

'I consider it the most difficult expedition that has been made so far in the Rockies and the Selkirks. Bohren (who has made, with Mr. Outram, the first ascent of Assiniboine) says that it is much more difficult than Assiniboine.

'It exceeds also in difficulty everything I have done myself in the Alps and Rockies. Perhaps the ascent would be a good deal easier if snow and rocks were in good condition.

'To future climbers, who take this route, I recommend :—

'1. That the party should not consist of more and not less than three.

'2. That two good ropes be brought.

'3. Only to go in excellent weather and good condition of snow.'

A Lunch on the Forest.

CHAPTER VI.

OTHER MATTERS OF GENERAL INTEREST.

Trails, Bridle-paths, Cabins, Etc.

THE foregoing chapters of Part IV. give, in so far as records are available, a sketch of the mountain climbing that has been accomplished, in the portion of the Selkirk range adjacent to the line of the Canadian Pacific Railway, up to the end of 1903. It is not likely that any climbs worthy of note have been omitted. It will be seen that, during the seventeen years which have elapsed since the opening of the Canadian Pacific Railway, not much has been done. While Mount Sir Donald has been

ascended at least twelve times, probably on account of its easy accessibility and prominence, no second attempt had been made on Mount Bonney until the year 1902, and to the Rev. W. S. Green's party still belongs the honour of being the first and only one to set foot upon the summit. Swiss peak was ascended for the second time in 1901, eleven years subsequent to the first ascent, and Rogers peak for the second time in 1902. There are no records of ascents of Mounts Hermit, Tupper or Green. Uto peak and Mount Sugarloaf have, according to the records, been ascended but once; the former by Huber and Sulzer, the latter by Huber, Topham and Forster: Cheops is only on record for two ascents. Mount Sifton has been ascended but once; Mount Roy (Ursus Major) but once; the two peaks at the head of Cougar creek (Mount Bagheera and Catamount peak) but once. Many fine peaks have not been approached at all: noticeably, an isolated rock tower with several outlying spurs and dependent glaciers immediately to the west of Mount Bonney above the railway on the south side (it has been named Mount Smart after the Deputy Minister of the Interior.) There are many fine peaks to be found on the west side of Flat and Fish creeks, both north and south of Albert Canyon and, according to the evidence of Huber and Topham, of W. S. Drewry and of the Topographical Survey of last summer, to the south and east of Fish creek beyond the present limits of exploration, that are equal in altitude if not exceeding those surrounding the summit of Rogers pass. North of Hermit range, at least three isolated peaks rise supreme above their fellows, one of them, that to the north-east, undoubtedly the highest in the Selkirk range. There is much that may yet be done before these peaks are known, named and mapped.

The reason for so little being done is presumably found in the lack of accessibility, and matters will so remain until trails are made and cabins built rendering extended expeditions possible. Improvements in this respect can only be made at

the instance of the government or the railway company, unless, as previously advocated, a Canadian Alpine Club should be formed with a Selkirks section to look after affairs connected with mountaineering and exploration in this region, to create a demand for more hotels and to institute a corps of trained guides and porters resident in the country.

Of existing foot and bridle-paths there are few and they only reach to the nearest available points of interest. They serve the purpose of the traveller stopping for a day or two on his passage to or from the Orient, or of casual summer tourists spending a few days here and there; meanwhile many of the more wonderful and most beautiful parts of the region are still unreached and unknown. Even as matters now exist, improvement might be made at a small outlay: A path up Bear creek and down Cougar creek would open up new fields and a fresh series of panoramic splendors; a path from Rogers pass station to the colony of glaciers lying on both sides of the Hermit range to the north would give access to its highest summits and all that lies beyond:* a path up Loop creek would place Mount Bonney within easy reach of a one-day excursion and permit of a landscape being enjoyed to the south and west that is now cut off by its great rock façade; and finally, a path starting at about No. 1 snowshed and leading up the long timbered spur of Mount Macdonald would be altogether a new feature and invite the conquest of that, so far as records go, virgin peak.† The foregoing are all close at hand and permit of one-day trips. Cabins erected at some of the terminal points would undoubtedly render them much more useful and add the novelty and charm of a night or two's camping out.

For more extended journeys, bridle-paths up Beaver valley and to the plateaus of Bald mountain, both of which now exist,

* Constructed in 1893 since above was written.
† Ascended in 1893 since above was written.

only require to be kept open. They would in the one case lead to the head of the Beaver river, and in the other permit lovers of mountain scenery to behold a most wonderful serie array of magnificent glaciers, tumbling in wildest confusion over the sky-line edge of the precipitous rock escarpment of the axial range into the misty blue valley, lying thousands of feet below: Avalanche glacier, Eagle glacier, Uto glacier, Sir Donald glacier, Deville glacier, Grand glaciers, Beaver glacier, Dunean glaciers and many others yet unnamed. A cabin at the Divide, between the Beaver and Dunean rivers, where are some beautiful lakelets, would then allow the ascents of Mounts Sugarloaf, Dunean, Beaver, Grand mountain, Beaver Overlook, and many peaks of the interior to be made, together with a return to Glacier House, viâ the Illecillewaet névé or the Donkin and Asulkan passes. Again, a bridle-path to connect with the existing Flat creek trail, would lead by a different line of approach to still another section of deepest interest, viâ the Flat creek pass and Jeopardy slide to the Government trail down Fish creek. From here, a branch path to the head of Fish creek and its branch Geikie creek would give access to the wonderful peaks, glaciers and snow-fields on the west side of the former stream, a new approach to Mount Bonney and the Geikie glacier; with a return home by the Asulkan pass. Truly there are great possibilities in store in the immediate vicinity of the Selkirks summit.

The meadows at Rogers pass and in the Asulkan valley, if fenced in, would furnish good summer pasture for ponies, which, during the winter, could be shipped to better feeding grounds. A supply of blankets and staples in canned foods kept at the several cabins erected, which articles could be placed under a system of supervision by the guides employed, would render few porters and pack animals necessary and a larger number of animals available for mounts. The cabins could be built with a good stone hearth and chimney and several bunks, similar to

many in the lumbering districts of Muskoka. In them, a good blazing fire and soft beds of boughs could then be made. It would be essential that such halting places should be kept clean and in repair with a supply of wood in hand, ready for immediate use.

Meteorological.

In the appendix will be found an article by Mr. R. F. Stupart, Director of the Meteorological Service of Canada, dealing briefly with the climate of the Upper Mainland of British Columbia. In it, he refers to the cause producing the effect known on the eastern slopes of the Rockies and prairie lands adjacent thereto as 'the Chinook' winds and, in a lesser degree, in the wide valleys and open plateaus between the various ranges intersecting the western portion of the North American continent. Mr. Stupart also refers to the various degrees of precipitation, both rain and snowfall, and the laws governing them throughout the several mountain districts. He accompanies his remarks by mean tables of temperature and precipitation extending over a series of years at Donald, Glacier, Griffin lake and Kamloops. The article will be found most interesting and instructive.

Of meteorological or optical phenomena seen in the Selkirks little has been written: a brief reference to cloud effects by Mr. Drewry, an account of an electric storm encountered by Herr Sulzer on Tupper Crest, another by Mr. George Vaux on Mount Sir Donald and a few other storms, with a reference here and there to sunrises and sunsets, constitute the whole of it. There are, however, many others. Rainbows may be seen in every grade of intensity and in every conceivable position: High arched in the sky, bridging wide valleys, spanning narrow gorges; above, below and almost at hand, where the traditional pot of gold seems within touch.

Again, the 'Spectre of the Brocken' is not confined to the Harz mountains. In 1901 it was seen by the writer on Cougar

mountain. The requisite conditions are a near-by bank of cloud and the sun in nearly the same horizontal plane as the spectator. The shadow of the spectator is thus thrown up on the cloud bank, its size depending upon the distance the cloud is away. In the case under discussion, the shadow was large and surrounded by a rainbow-lined disc of not very distinct prismatic colours. It is said that, if the cloud-bank is very dry, the shadows of companions, as well as your own, can be seen, but if the cloud bank is very damp, each person can only see his own shadow. In this case only the one shadow was visible.

The writer has seen the curious phenomenon once before: on the eastern slope of the Rocky mountains. We were observing angles on Sentinel mountain. To the east, the cliffs descended sheer for several thousand feet. Along the face of the escarpment, a dense bank of cloud had sprung from nowhere and blotted out the landscape. By putting out your hand you could almost touch it. To the west, all was clear and the sun shining brightly. On the bank of cloud appeared a small circular disc, showing in very brilliant circles the colours of the rainbow. In the centre a sharply defined black manikin represented each of the spectators to himself. It was very ludicrous. You took off your hat; so did the manikin. You made him a polite bow; it was promptly returned. You held up your hands in deprecation; the manikin did likewise. The other member of the party, an Irishman from Cork, was very much struck by the illusion and exclaimed 'Begorra that's foine!' 'Sure! I wonder would it go away if ye threw a shtone at it!' The prismatic circle is called the 'Broken bow,' but the background is not always in this form, sometimes appearing as a coloured fringe.

The study of the formation and shape of clouds is also of much interest. Standing on a high crest, clouds are often seen to form, on a bright sunny day, below you even as you look at them and again to dissipate just as mysteriously. There will

A Snow Mystery.

not be a cloud in the sky and yet directly around some particular high peak a cloud will hang all day long. This was a phase much studied by the Topographical Survey while waiting for a sight at a hidden signal.

Snowfalls produce most interesting effects, seen on the higher peaks, where the action of wind and frost is unchecked. Here, on the rocks, may be observed most wonderful configurations: branches, sprays and pendants as well as cliffs, precipices and cornices lined and set with icy teeth. Below in the woods, enormous snow-mushrooms gather round the stumps and huge snow-fungi on the tree trunks.

In addition may be mentioned the effects of natural phenomena, such as disintegration of the masses by the action of frost and sunshine, the scooping out of channels by erosion, the grinding process that reduces the larger fragments to stones and boulders, then to gravel and finally to silt and alluvial deposits. They are of great interest and may be studied by taking photographs at periodical visits. J. J. McArthur writes of his second ascent of Mount Stephen in 1892. 'I had no difficulty in following my former track until we came to the second stage of cliffs, to surmount which in 1887 we had to cut our way up a step incline of ice, which filled a deep fissure. To my surprise, the face of the mountain has greatly changed since then, as fully 200,000 cubic feet of rock, which formed the western wall of the fissure had been displaced and fallen into the amphitheatre below.' In the light of the recent great rock slide on Arrow lake, and the fall of a large portion of Turtle mountain in the Crows Nest pass, one can readily appreciate Mr. McArthur's statement.

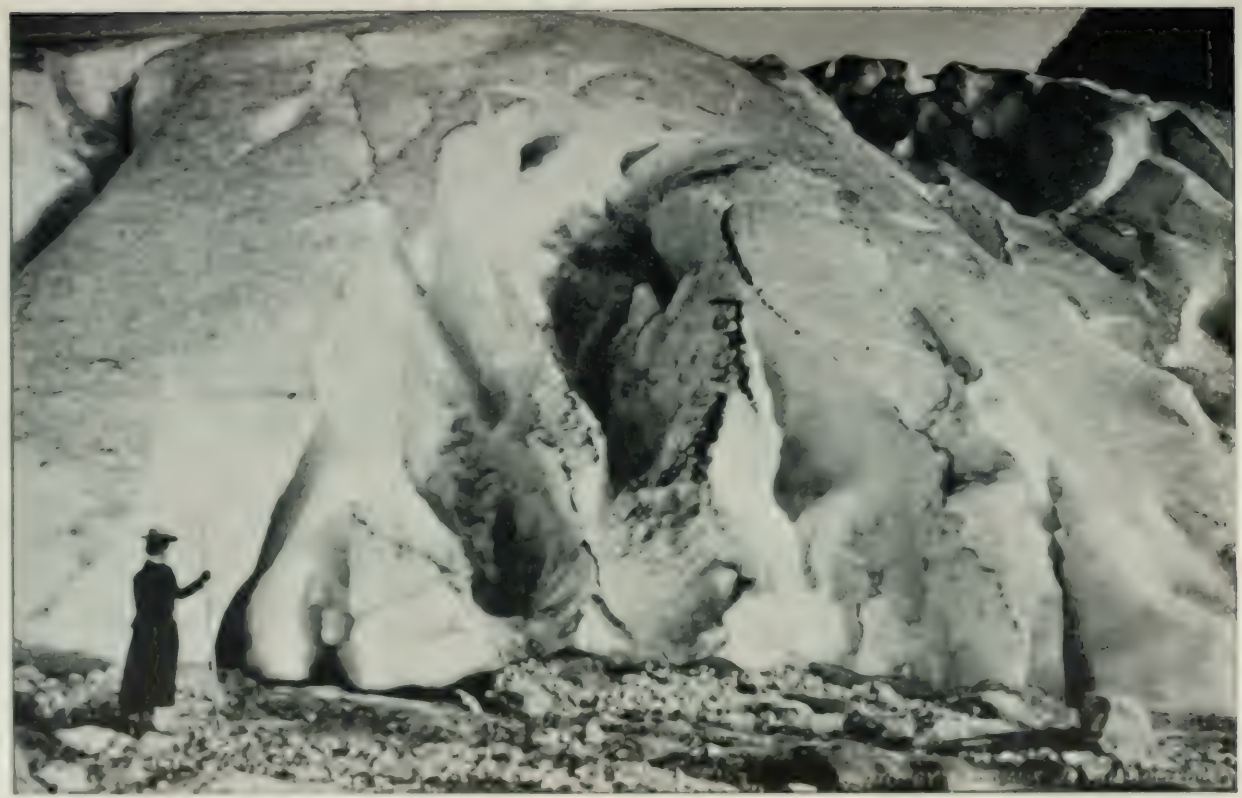
Action and Movement of Glaciers.

In 1898, a supplementary Minute-book was opened at Glacier House for the purpose of recording matters of general scientific interest. Among the first entries made is a general statement by Mr. Wm. S. Vaux, of the series of investigations

carried on by himself and his brother in connection with the movement, rate of flow and general change of appearance of the Illecillewaet and Asulkan glaciers. It is aimed in this statement to supply information that will enable interested visitors to make intelligent observations and carry them on from the point at which they were last left off, and then to enter the results obtained, and so on. The statement is accompanied by a number of photographs and a map of the tongue of the Illecillewaet glacier and surrounding moraines.

A glacier, in the modern acceptation of the term, is a river of ice draining a rock basin filled by ice and snow up among the clouds.

The heavy precipitation of these regions falls, at high levels, in the form of snow, which soon fills up the rock basins between the various summits and crests. The great weight of the mass compacts the under portion into clear crystal ice—just as though you took a handful of snow and squeezed it until it became a transparent crystal, then let it freeze. Here you have ice the same as in a glacier. The overflow from the basin is an ice river covered by snow until it reaches lower levels, where the snow covering is melted off and clear ice exposed. This is the ice-fall of the glacier. Heat and cold, contraction and expansion, cause huge cracks to form across the ice river; these are called crevasses and are of all sizes. Sometimes the crevasses cross each other in opposite directions. The result is a series of pillars of fantastic shapes, towering aloft like a city of newly raised mummies; they are known as *séracs*. The basin filled with snow, or snow field, as it is often spoken of, above the glacier is called the *névé* or *firn*. The flow of a glacier is just like that of a river: the centre of the stream moves faster than the sides or bottom; while on a curve, the outside edge flows more rapidly than the inside. Again, at a narrow place, the flow is faster and the glacier is broken and cracked, resembling the broken water of a rapid. Moraines are the piles of mud, rock



Tower of the Hoodlebrain Giants.

and loose boulders along the sides, at the end and in the centre of some glaciers. They are respectively known as lateral, terminal and medial moraines.

The materials of which they are formed have, through the course of ages, been carried by the glacier and piled up or deposited where they are now seen, in somewhat the same manner as a rapid stream or river deposits along its shores the drift wood and detritus it brings down, only, of course, the flow of the glacier is very, very slow, a few feet in the year, and the piling up process has taken ages of time. If the rate of the flow of the glacier over its rocky bed, caused by gravitation and pressure from above, is greater than the annual loss by melting during the summer months, the glacier is advancing, if less, it is retreating.

The investigations now being carried on by the Messrs. Vaux have chiefly in view the two principal movements referred to. There is also a third study, which is best done by means of a series of photographs from the same position, viz.: the change in the general appearance of the glacier. Observations of the Illecillewaet glacier were commenced by the gentlemen named in 1887. It was visited on July 16, and a number of photographs taken. At that time alder bushes grow within twenty feet of the snout of the glacier and where now ample space exists was covered by a great mass of ice, with steep sloping sides. The general conditions pointed to a period of advance not long terminated.

In 1888, the Rev. W. S. Green and Rev. H. Swaney included among the operations of their topographical survey some observations relative to the movement of the Illecillewaet glacier. Holes were bored in the ice and a row of poles set up. When visited twelve days afterwards, all the poles had fallen, owing to the surface melting at their base. The bottom of the holes were found in a few cases, the poles set up and observations taken. It was then ascertained that a pole near the moraine had

in twelve days moved seven feet, one further out ten feet and one in the centre twenty feet. From two rows of boulders dropped in front of the snout, it was deduced that the glacier had retreated about sixty feet during the past year, and from the inner row within the present year (1888). Mr. Green concluded his observations by turning some of the boulders in closest proximity to the ice, so that future retreat might be observed by other travellers (W. S. Green's 'Among the Selkirk Glaciers.')

In 1890, Mr. Harold W. Topham also made some observations in connection with the same glacier, and at the close of his article in the Alpine 'Journal' of May, 1891, previously referred to, makes the following request:—'In conclusion, I will ask any one intending to visit the Selkirks to obtain from me certain data, which will enable him to continue the observations which I commenced for the measurement of several of the glaciers.'

In 1894, 1897, 1898, 1899 and 1900, Messrs. George and W. S. Vaux again took observations, the work done in 1898 being properly systematised. The lapse of eleven years since 1887, had enabled them to notice some very distinct changes. In the year specified, a number of rocks were marked and the relative position of the ice observed. Sixty-eight days later observations were again taken and it was found that the snout had receded forty-six feet during that period. In a well written and well illustrated mono-graph, being an excerpt copy from the Proceedings of the Academy of Natural Sciences of Philadelphia, February 7th, 1899, Messrs. George and W. S. Vaux remark in reference to the Illecillewaet glacier: 'There are several rocks on the moraine which have marks or dates as old as 1890, but most of them are so worn as to be almost illegible. We found one, however, near the farther moraine, above referred to, which, if it had not been moved, indicated that in August, 1890, the snout was sixteen feet above a certain mark. The distance from that mark to the snout in August, 1898, was four

A Wilderness of Stone.

hundred and fifty-two (452) feet, or an average recession of fifty-six (56) feet during the period of eight years. There is reason to believe, however, that for a part of this period the glacier remained more nearly stationary, and in the remaining years made up for the deficiency by a much more rapid melting away.' The same year, observations were commenced of the Asulkan glacier, similar methods being used as in the case of the Illecillewaet glacier.

In 1899, Mr. W. S. Vaux made an instrumental survey of the forefoot of the Illecillewaet glacier and its vicinity, and published a map, a copy of which is found in the Minute-book at Glacier House, above referred to. If preserved, this map will be of very great value and assistance in the conduct of future observations. At the time of the survey, eight metal plates were placed in line across the glacier, at right angles to its flow, at a place where it was about one-third of a mile wide. A base of 229′ 6″ was then measured on the high right-hand moraine, about 1,000 feet above the snout of the glacier, a transit-theodolite set up at each end and readings taken to each plate. A base also of 334′ 6″ was measured on the ground moraine in front of the forefoot and a number of points fixed by readings from both ends. In addition the relative positions of a number of marked rocks and rocks for future reference were located.

The results for the period from July 31st to September 5th are duly tabulated in the note referred to. The average daily motion during that period of the plate nearest the base line, on the inner circumference, or concave curve of the glacier, is recorded at 2·56 inches, the two centre plates at 6·77 and 6·96 inches and the farther plate, that nearest the outer circumference or convex curve of the glacier, 6 inches. The two plates between the inner and centre ones were respectively 3·9 and 5·51 inches, and the two between the centre plates and the outer one 6·79 and 6·16 inches, respectively. A ninth plate was placed a few feet above the tongue of the glacier, but owing to the portion of the

ice on which it was placed having broken off, the value of the observation was much impaired.

The plates used are six inches square and painted red to facilitate identification when observing on them. Pieces of three-quarter inch gas-pipe, three inches long, projected from them on the under side, which, sunk in the ice, act as anchors. In the observations of 1899 Messrs. Vaux were assisted by the late E. J. Duchesnay, Assistant General Superintendent of the Pacific division of the Canadian Pacific Railway and by H. B. Muckleston and C. E. Cartwright, assistant engineers of the same company.

The next readings were taken on the 6th of August, 1900. A period of two years then elapsed and no further readings were taken until the 26th August, 1902, at which time they were taken by the Topographical Survey as previously mentioned. Mr. George Vaux has kindly furnished me with a table showing the result of the observations taken in 1900 and also of those taken in 1902, which is here appended.

TABLE showing Total Average Daily Motion of Line of Plates on Illecillewaet Glacier, Glacier House, B.C.

Number of Plates.	From 31st July, 1899, to 6th August, 1900. Total Motion.	Average per day for 372 days.	From 31st July, 1899, to 26th August, 1902. Total Motion.	Average per day for 1,122 days.	From 6th August, 1900 to 26th August, 1902. Total Motion.	Average per day for 750 days.
	Ft. In.	Inches.	Feet.	Inches.	Ft. In.	Inches.
1	88 7	2 86	291	3 11	202 5	3 23
2	174	4	360	3 94	146	3 94
3	179 8	4 31	404	4 32	264 1	4 22
4	181	4 84	Not found			
5	168	6 67	487	5 21	290	4 78
6	197 5	6 36	556	5 48	361 6	6 77
7	198 6	6 41	547	5 86	353 6	6 13
8	179	5 48	Not found			

Results of Observations made by George and William S. Vaux, assisted by Instrumental work by Arthur O. Wheeler, 26th August, 1902.

With regard to the recession of the snout of the glacier the following may be of interest : In 1898, a rock marked with a cross inside of a circle, in red paint, and lettered 'C' on the Vaux map of the glacier tongue and its moraines, was stated to be, by measurement, 60 feet from the nearest ice of the snout. The following measurements have since been made :

				Feet.
August 17th, 1898—	Rock 'C,'	distant	from snout.	60
July 29th, 1899—	"	"	..	71
August 7th, 1900—	"	"	..	140
August 26th, 1902—	"	"	..	203

Measurements made from centre of cross in circle.

Messrs. George and W. S. Vaux have published a number of monographs upon the subject of their investigations. They are as follows :—

(1) 'Some observations on the Illecillewaet and Asulkan Glaciers of British Columbia,' excerpt copy from the Proceedings of the Academy of Natural Sciences of Philadelphia, February 7th, 1899.

(2) 'Additional observations on Glaciers in British Columbia,' excerpt copy from the same set of Proceedings, December, 1899.

(3) 'The Great Glacier of the Illecillewaet,' extracted from *Appalachia*, IX., 2, March, 1900.

(4) 'Observations made in 1900 on Glaciers in British Columbia.' From the Proceedings of the Academy of Natural Sciences of Philadelphia, March, 1901.

(5) 'Glaciers,' a tastily arranged and artistically illustrated little monograph, giving some information relative to the formation, action and characteristics of glaciers in general and the Illecillewaet glacier in particular. A Glossary of terms used in connection with glaciers is given in the last page and is now quoted as valuable information to intending visitors.

'GLOSSARY.

'*Bergschrund*. The great crevasse separating the commencement of a snow-field from the mountain side.

'*Crevasse*. A crack extending into the ice, often of great width and depth.

'*Dry Glacier*. The lower part of the glacier where it is free from snow.

'*Glacier-Table*. A large block of stone, on a dry glacier, balanced on a column of ice.

'*Moraines*. The piles of rocks and stones surrounding a glacier and which have been transported by it.

'*Moulin*. A shaft or well cut through a glacier by a stream.

'*Névé*. The snow-field from which a glacier flows.

'*Serac*. An ice tower formed by the intersection of transverse and longitudinal crevasses.

'*Tongue* or *Snout*. The end of the glacier ; the forefoot.'

Among others who have made observations in connection with the Illecillewaet and Asulkan glaciers are Messrs. Parker B. Field and the late Philip S. Abbot of the Appalachian Club.

Also articles have been published by Professor Albrecht Penck, appearing in Jahrbuch des Deutschen und Osterreichischen Alpenverein, Vol. XXIX., 1898, entitled 'Der Illecillewaet Gletscher im Selkirk Giberge,' and in the proceedings of the Canadian Institute, No. 2, 1899, entitled 'The Illecillewaet Glacier in the Selkirks.'

The following note appears in the Minute-book at Glacier House previously referred to :—

'In connection with the foregoing interesting remarks and observations by Mr. Vaux, it may be noted that measurements were taken and marks made near the end of the Illecillewaet glacier on two occasions, within recent years, by Mr. R. G. McConnell, of the Geological Survey of Canada. Some of the

A Glacier Table.

marks noted by Mr. Vaux may have been made by Mr. McConnell. On September 3rd, 1897, Prof. A. Penck, of Vienna, spent a day at Glacier House with members of the British Association on an excursion to the coast. A sketch plan of the end of the glacier was made by Prof. Penck and several rocks were marked. A copy of the sketch is on record in the Geological Survey of Canada.

'GEORGE M. DAWSON,
'*Director, Geological Survey of Canada.*

'August 31, 1898.'

Below is the following note without signature:—

'In der Zeitschrift des Deutschen und Osterriechischen Alpenverein, Vol. XXIX., page 55, Prof. Penck gives a most interesting account of the visit referred to above by Dr. Dawson with reproductions of photographs showing the recession of the tongue of the glacier from 1888 to 1897.'

Another note is as follows :—

'On the 12th August, 1902, I measured the distance from the round boulder mentioned on page 123, marked "60' 0" to snout, VIII, 17, '98," and found the distance to be 218' 9". It would be interesting if weekly observations could be made of the flow of the glacier, showing whether it accelerated or diminished as the summer advanced. Records of snowfall and temperature would be also interesting factors.

'HENRY A. BLAKE,
'*Govr. of Hong Kong.*'

Daily records of precipitation and temperature are now kept at Glacier station. Attached to Mr. R. F. Stupart's article in the appendix, entitled 'Climate of the Upper Mainland of British Columbia,' will be found a table giving the means of a series of such observations at Glacier, extending over a period of five years.

By far the most systematic and satisfactory series of observations have been made by Messrs. George and W. S. Vaux, Jr. Their instrumental work to ascertain the rate of flow appears to have been carefully executed, and the rocks marked and located to determine the advance or recession of the forefoot to have been well mapped. A number of excellent photographic views taken through a series of years by these gentlemen, several of which are here reproduced, show the change in the external appearance and surface workings. An album of such views, properly described and catalogued, at Glacier House would be of much interest and value in the future.

Natural History.

As regards the above, an article relating to this branch of science will be found in the Appendix, written by Professor John Macoun, Dominion Botanist and Naturalist. The botanical notes are now published for the first time. In the Minute-book set aside for scientific purposes, Mrs. Chas. Schäffer calls attention to the birds around Glacier House. It seems a pity that so little is known about them and the smaller mammals. While the larger game animals are few, comprising chiefly the Bear (probably three different species), the Caribou, a smaller variety of deer, and the Mountain goat, there are at least six different species of grouse: The blue grouse, Franklin grouse or fool-hen and the Rocky mountain ptarmigan, found at higher altitudes, and three other species, if not more, found in the wooded lower depths of the valleys. The Whistler (Hoary marmot or Sifflour) dwells in every rocky amphitheatre. The fox (*vulpes vulpes, Linnæus*), though seldom seen, is known by his numerous tracks on the snow. In the Illecillewaet and other streams may be found the trout of the Upper Columbia—the Kamloops trout (*Salmo Gairdneri Kamloops*).

Photo Mrs Schaffer
Philadelphia

Relief Map of the Topography Surrounding Rogers Pass.

With reference to maps that have been made and published of the portion of the Selkirk mountains surrounding the Rogers pass summit, it is desired to mention the relief model made by the Canadian artist, Mr. F. M. Bell-Smith, R.C.A. It is now on exhibition in the billiard-room at Glacier House. The model has been purchased and placed there for the information of the guests, who intend making explorations in the vicinity. It shows the relative position of the mountain masses, snow-fields and glaciers with their respective names, the railway line, watercourses and trails, all of which are depicted by contrasting colours. Generally speaking, while there are some minor matters of detail that are not quite correct, it gives an excellent idea of the immediate region, and a study of it enables the observer to obtain a valuable previous knowledge of his surroundings, and consequently, upon making an ascent, an intelligent understanding of the same.

Although the vertical scale is, of necessity, much exaggerated in models of this kind, in order to make the mountains and other elevations stand out in relief, the feeling is one of disappointment that the contrast is not more marked, and lack of skill and truth are frequently ascribed to the artist. There certainly is a lack of truth but it is in the opposite direction to that imputed by the beholder. Were the mountains and valleys shown in their proportional heights and depths, they would be, as compared with the extent of the earth's surface, no more than the roughness upon the skin of an orange.

As an illustration of this may be cited the following : The circumference of the earth is nearly 25,000 miles, the summit of Mount Macdonald is almost exactly one mile above the railway ; that is, the height of Mount Macdonald is one twenty-five thousandth part of the entire circumference. Take now the one twenty-five thousandth part of the circumference of an orange and on a sphere of that circumference you have the height of

Mount Macdonald. It will thus be seen that at any scale upon which it would be possible to construct such a model the mountains would not make much of a showing without very considerable exaggeration.

Technical Terms.

In addition to the glossary of terms supplied by Mr. Vaux in connection with glaciers are a number of others that are frequently met with in mountain literature and talk. The meaning of a few of the more common ones may be instructive.

Arête.—The sharp ridge, edge or rocky spur of a mountain. Used in connection with snow as well as rock.

Col.—The crest of a neck or pass between two mountain peaks, usually though not necessarily covered with snow.

Couloir.—A gully, depression or ravine in the steep sides of a mountain or peak, generally though not necessarily filled with snow.

Divide.—The height of land between two drainage basins. The watershed.

Firn.—Accumulated snow before it has been consolidated into the ice of a glacier, corresponds to névé or snow field above a glacier.

Gendarme.—Name applied to an isolated rock tower or pinnacle, separated from the mass of which it had originally been a part.

Glissade.—To slide down a steep snow-slope—sometimes performed sitting, sometimes standing according to the condition of the snow.

Grat.—An edge or ridge, corresponds to arête.

Laugthal.—A long valley. The depression between a moraine and the mountain side, usually snow-filled.

Mittelgrat.—A middle edge or ridge, as for instance, the rock-ridge between two snow-fields or parts of a glacier.

Reëntrant.—Rocks are frequently spoken of as being at a reëntrant angle, i.e., their faces slope inwards from the perpendicular.

Scree.—Pile of loose broken rock at the foot of a cliff.

Summit.—Highest point of a mountain or peak. The lowest part of a mountain pass. The highest crest of a ridge. The highest point crossed by a railway or road over a mountain range or range of hills, etc.

Watershed.—The divide between two drainage systems or catchment areas. The height of land between two streams flowing in different directions.

Outfitting.

At Banff and Field, within the mountain belt, will be found a number of outfitters, who will relieve mountaineering, hunting and camping parties of the trouble of looking after these matters, for a consideration. They will supply ponies, camp equipment, packers, guides, etc., and if they are reliable and know their business will probably be found the cheapest method. A personal supervision, however, is very strongly advised.

If, on the other hand, it is desired to conduct your own outfitting, there are a number of adjacent points along the line of the Canadian Pacific railway where this may be done, in so far as the more ordinary supplies are concerned: Winnipeg is midway between Montreal and the Pacific coast, Calgary, at the eastern base of the Rockies, is one hundred and twenty-three miles from the summit of the main divide. Golden lies in the Columbia valley between the Rocky and Selkirk ranges. Revelstoke is at the western base of the Selkirks. Kamloops is on the Thompson river, beyond the Gold range. Vancouver is the Pacific terminus of the line. They are all good points. The Hudson's Bay Company have stores at all, except Golden and Revelstoke. Here, or at other leading business establishments

may be had all necessary staples of provisions, such as : meats, flour, canned goods and evaporated fruits. Tents, blankets, camp-stoves, cooking utensils, pack-saddles, firearms, ammunition and fishing-tackle can also be had at low rates as compared with the cost of bringing such supplies from more distant points, and the standard of excellence is equally high. In the case of firearms and fishing tackle, a better selection can probably be had at the larger places, Winnipeg and Vancouver. Even at Rogers pass summit is a trading store (C. D. Morris) where all necessary provisions of good quality can be had.

Articles of special manufacture, such as: alpenstocks, ice-axes, rucksacks, rope, and all other adjuncts of the mountaineers personal outfit must be brought from Europe or the large centres of the United States, for at the present time there is no special manufacture of these in Canada, and such as are made are not reliable. Shooting-boots, climbing-boots, sleeping-bags, and articles of similar description can be bought at Montreal, Ottawa, Toronto, Winnipeg, or Vancouver. Pack-ponies can be had at Calgary, Golden, Kamloops, and possibly at Revelstoke. Men to act as porters are difficult to obtain and require high wages. Even then, they are inefficient and unaccustomed to carrying loads over ice or snow. It is possible that—as Mr. Baillie-Grohman has suggested—Kootenay Indians can be had for this work. Indians, however, are progressing in civilized ideas and as they progress, become adverse to this style of carrying. The only remedy will be, as suggested, the formation of a Canadian corps of trained guides and porters, whose business it is to do this class of work, and who will reside in the vicinity and be on hand for service during the summer months.

1904.

Before closing this section, it is desired to add a short note of the work done during the summer of 1904.

Interior of Murray & Jeffris's Showroom, Chicago, Ills.

Three new peaks were added to the list of conquered, and several second ascents of importance. The principal work was done by ladies.

February 3.—The Reverend J. C. Herdman, of Calgary, attempted a mid-winter ascent, accompanied by the guide Edouard Feuz, Jr., who had remained the winter at Glacier. They reached the lower crest of Mt. Abbott. The climbing was chiefly on snowshoes.

August 4.—The Reverends J. C. Herdman, S. H. Gray and A. M. Gordon accomplished the first ascent of Mt. Hermit from the cabin recently built below the Rogers pass amphitheatre. They were guided by Edouard Feuz, Sr. The climb was found of much interest and, as a view-point, the peak stands unique, commanding superb views of Beaver river valley, Mountain creek valley, the Prairie hills and the distant Rockies.

September 2.—The second ascent of Mt. Bonney (10,200 ft.), and first ascent by a lady, was accomplished by Miss Henrietta L. Tuzo, of Warlingham, England. This lady was closely followed by Miss Gertrude E. Benham, of London, England. The two ladies adopted different routes. Miss Tuzo, guided by Christian Bohern, made the ascent via Marion Lake trail, Mts. Abbott, Afton and Lily glacier, ascending the escarpment of the Swanzy-Bonney ridge between Clarkes peak and Mt. Swanzy. Following the crest of the escarpment over Clarkes peak to the cairn erected by the Reverend W. S. Green in 1888, some distance beyond, they descended the face of the escarpment to the Bonney glacier and returned home by the morning route. A start was made from Glacier House at 3.15 a.m. and Green's cairn reached at 1 p.m. The return was commenced at 2 p.m. and Glacier House reached some time after 10 p.m.

Miss Benham, guided by Edouard Feuz, Sr., made the ascent via Loop creek, following closely in the footsteps of the Reverend W. S. Green. The difficult little peak, to which he refers, was passed on the north side. The party returned by the same route, but were unable to make the hotel, so camped for the night in the forest.

August.—Miss Gertrude E. Benham made the first ascent of Rogers peak (10,536 ft.) by a lady, and, following the arête northeasterly to Swiss peak, incidentally made the first ascents of Grant peak (10,216 ft.) and Fleming peak (10,370 ft.). She closed the trip by accomplishing the first ascent by a lady of Swiss peak (10,515 ft.). A little later, the same expedition was made by Miss Henrietta L. Tuzo, to whom belongs the second ascents by a lady.

While in this vicinity, Miss Benham made the first ascent by a lady and second recorded ascent of Mt. Sifton (9,643 ft.), the next peak westerly from Rogers peak.

Beyond the Asulkan pass, Miss Benham made the first ascent by a lady of Mt. Dawson (Häsler peak, 11,113 ft.) and of Mt. Selwyn (11,023 ft.), immediately to the southeast. She was in charge of Edouard Feuz, Sr.

Both Miss Benham and Miss Tuzo successfully accomplished the ascent of Mt. Sir Donald, making respectively the third and fourth ascents by ladies.

There were a number of other ascents of Mt. Sir Donald, of which the only remarkable one was that made by J. Duke Smith, of Boston, who, according to the records of the minute-book, left the hotel with the guide Christian Bohren at 4.08 a.m. and arrived at the summit at 8.35 a.m. Starting homeward at 9.30 a.m., the hotel was reached at 12.20 p.m.—eight hours and twelve minutes, with fifty minutes spent at the summit. The mountain was in the best of condition.

With regard to trails, little has been done beyond putting those already made in better condition. The cabin built on the slopes above Rogers pass, and trail leading to it, have given great satisfaction and been much in use. As a consequence, considerable activity has prevailed along this end of the Hermit range. A similar cabin on the divide between Bear and Cougar creeks (Baloo pass, 6,681 ft.) and a trail up Bear creek would open up the centre and western end of the range and give still greater satisfaction than that leading to the Rogers amphitheatre.

An impetus has also been given in the direction of Mt. Bonney, and to facilitate this movement, the trail recently projected to the foot of the Lily glacier should be constructed; at least to such an extent as to make it possible for ponies.

The old tote road of railway construction days has been opened out from the hotel to Cougar creek. It now remains to construct a trail up Cougar creek to Baloo pass and thus, with a trail up Bear creek to the same pass, constitute a round trip of surpassing beauty and interest.

Mention must not be omitted of the trail along the base of Mt. Avalanche to Rogers pass. It winds through some beautiful forest and supplies a much felt want. The walk is an easy one and the views, set off by astonishing cloud effects, are magnificent.

The new hotel at Glacier, opened this year, is most luxurious and homelike, and is fitted with every modern accessory to comfort; while the charming lady manager, Mrs. J. M. Young, makes her guests happy and satisfied, supplies their every want and gives them the very best time the changeable mountain climate will permit of. On the score of weather, the past summer has been an uninterrupted three months of sunshine.

The number of guides, ponies and facilities for transport were considerably increased; the latter, under the able management of Mr. G. W. Taylor, have given full satisfaction. It is proposed to further increase the number of ponies and transport facilities for next summer. The fact is plainly evident, that the Selkirk mountains, with Glacier House as a centre for tourists, are rapidly coming into prominence. Owing to their own distinctive individuality, they in no way enter into rivalry with the main range of the Rocky mountains, and a trip to the mountain regions of Canada is not complete without a visit to both of these mountain series.

TABLE

Of data concerning some of the High Peaks and other points of interest in the Selkirk Range, British Columbia.

NOTE.—Where dashes are shown data is incomplete.

Nomenclature.		Altitude in feet above Sea Level.	First Ascent.		Second Ascent.		Where Situated.
Name.	Origin of Name.		Year.	Made by	Year.	Made by	
Abbott, Mt.	After H. Abbott, C. P.R. superintendent	8081					South of railway between Asulkan and Loop creeks.
Abbott Ridge.	In relation to Mt. Abbott.						Long ridge known as Mt. Abbott.
Afton, Mt.	By Messrs. Abbott, Fay and Thompson	8423	1893	H. A. Perley, W. H. Rae and Miss Macleod	1894	C. E. Fay	On the Abbott ridge, west side of Asulkan creek.
Albert Canyon.	By Rev. G. M. Grant after Albert Rogers						Along railway two miles east of Albert Canyon Station.
Albert Creek.	By Topographical Survey.						Joins Illecillewaet river near Albert Canyon Station.
Albert Peaks.	By Topographical Survey.	N. Peak, 9562. S. Peak, 9208					South-west of Albert Canyon Station.
Albert Canyon Station.	By C.P.R. Co.	Rail level, 2227					Twenty-two miles easterly from Revelstoke.
Alder Creek.	By C.P.R. Co.						Joins Beaver river seven miles south of Beavermouth Station.
Asulkan Creek.	By Rev. W. S. Green.						Joins Illecillewaet river close to Glacier House.
Asulkan Falls.	Known as "The Seven Falls."						On west side of Asulkan creek, from Abbott ridge.
Asulkan Glacier.	By Rev. W. S. Green.						At head of Asulkan creek.
Asulkan Pass.	By Rev. W. S. Green.	7716	1888	Rev. W. S. Green and Rev. H. Swanzy			Between Asulkan and Geikie glaciers.

TABLE

Of data concerning some of the High Peaks and other points of interest in the Selkirk Range, B.C. *Continued.*

NOTE.—Where dashes are shown data is incomplete.

Nomenclature.		Altitude in feet above Sea Level.	First Ascent.		Second Ascent.		Where Situated.
Name.	Origin of Name.		Year.	Made by	Year.	Made by	
Asulkan Pass	By Rev. W. S. Green	7716	By a lady, 1896	Mrs. Dr. Stallard			Between Asulkan and Geikie glaciers.
Asulkan Ridge		9329					Between Illecillewaet and Asulkan glaciers.
Augustine Pk.	By Topographical Survey	10,762					Easterly of two highest peaks of the Bishops range.
Avalanche, Mt.	Owing to numerous avalanches	9387	1881	Major Rogers and party.			Immediately south of railway at summit of Rogers pass.
Avalanche Chute	In relation to Mt. Avalanche.						Southerly extension from Mt. Avalanche.
Bagheera, Mt.	By Topographical Survey	9096	1902	Topographical Survey.			Westerly of two high peaks on north side at head of Cougar creek.
Bain Creek	Unknown						Tributary to Fish creek from west.
Boldt, Mt.	Local name	7063					On east side of Beaver river opposite Mts. Sir Donald, Macoun and Topham.
Baker Pass	By Topographical Survey	6681					Between Bear creek and Cougar creek.
Battle Glaciers	By Topographical Survey						At head of Battle creek between Mts. Purity and Wheeler.
Battle Creek	Owing to a fight between a grizzly and a prospector						Tributary to Fish creek from the east; heads immediately east of Mt. Purity.
Battle Spring	In relation to Battle Creek						On east side of Fish creek about a mile south of Battle creek.
Bear Creek	Much haunted by bears; local name						At south base of Hermit range flowing through valley of Rogers pass on eastern slope.

Bear Creek Station.	By C.P.R. Co.	Rail level, 3673				Station on C.P.R. about one mile north of the junction of Bear Creek with Beaver River.
Beaver, Mt.	By Huber, Topham and Forster.	10,644				On south side of glacier forming source of Beaver river.
Beaver Glacier.	By Huber, Topham and Forster.		1899	Huber, Topham and Forster.		Source of Beaver river, on west side of watershed of Beaver-Duncan valley.
Beaver Overlook.	By Topographical Survey.	9901	1902	Topographical Survey.		On west side, overlooking Beaver valley, at head of Deville neve.
Beaver River.	Formerly mouth unexplored by Beaver; local name.					Joins Columbia river near Beaver-mouth station.
Bishops' Range, The.	By Topographical Survey.	10,762	1902	Topographical Survey.		Formerly named 'Mitre range,' immediately south of Dawson range.
Bishops' Glacier, The.						See Mitre glacier, page 382.
Black Creek.	By Topographical Survey.					Drains Black glacier on south side of the Bishops' range.
Black Glacier.	By Topographical Survey.					Formerly named 'Dirty glacier,' on south side of the Bishops' range.
Bonney, Mt.	By Rev. W. S. Green.	10,200	1888	Rev. W. S. Green and Rev. H. Swanzy.		On west side at head of Loop creek.
			By a lady, 1904	Miss Henrietta L. Tuzo.	1904 Miss Gertrude E. Benham.	
Bonney Glacier.	In relation to Mt. Bonney.					On east side, below great escarpment of Mt. Bonney.
Bonnie Pass.	By Topographical Survey.	8150				Between Ursus major and Ursus minor.
Cascade, The.	By Miss M. Vaux.					Peculiarly shaped rocks on summit of ridge of Mt. Tupper.
Catlow Creek.	Local name.					Tributary to Illecillewaet river from north, between Rose peak and Illecillewaet station.
Carbon, Mt.	By Order in Council.	8562				On east side of Columbia river seven miles south of Revelstoke.
Cascade Mountain.	Local name.	5252				Opposite Glacier House, below Avalanche crest.

TABLE

Of data concerning some of the High Peaks and other points of interest in the Selkirk Range, B.C.—*Continued.*

NOTE.—Where dashes are shown data is incomplete.

Nomenclature		Altitude in feet above Sea Level	First Ascent		Second Ascent		Where Situated
Name	Origin of Name		Year.	Made by	Year.	Made by	
Carnarvon Tor	Local name						(1) Opposite Glacier House. (2) On north side of Bear creek valley, between snow-sheds Nos. 2 and 3.
Cheops Peak	By Abbot, Fay and Thompson	9108	1895	Abbot, Fay and Thompson.	1897	H. B. Dixon, A. Michael, C. L. Noyes, C. E. Fay, J. R. Van Derlip, P. Sarbach (guide).	On west side of the Asulkan valley, between the Asulkan and Swanzy glaciers.
Clearmont Peak	By Topographical Survey	8956	1902	Topographical Survey.			Easterly of two high peaks on north side of Cougar creek, near head.
Cedar Station	By C. P. R. Co.	Rail level 3188					Station of C. P. R. on west side of Beaver valley.
Cedar Creek	Local name						Joins Beaver river from west, close to Cedar station.
Cheops	By Otto J. Klotz	8506	1893	S. E. S. Allemand D. W. Wilcox	1902	2nd recorded ascent, Geo. F. Archer	Immediately west of Rogers pass, between Bear creek and Illecillewaet river.
Clach-na-cudden group of sths.	Unknown	8675					On north side of C. P. R., between Silver creek and Revelstoke.
Cheops Peak	By Topographical Survey	9054	1902	Topographical Survey	1904	Miss Henrietta Tuzo	Between Mt. Bonney and Mt. Swanzy.
Cougar Creek	Local name						Joins the Illecillewaet river from the north, three and a-half miles west of Glacier station.
Cougar, Mt.	Unknown	7882	1902	F. E. Wires and Mrs. E. S. Wires			Immediately west and south of Cougar creek.

Cyprian Pk.	By Topographical Survey.	10,712						Westerly of two highest peaks of the Bishops' range.
Dawson Range.	By Rev. W. S. Green	11,113						On south side of Geikie glacier and Illecillewaet neve, comprising Mts. Fox, Selwyn (Deville), Dawson and Donkin.
Dawson, Mt.	By Rev. W. S. Green	11,113	1899	Professors Fay and Parker.	1901	B. S. Comstock..		Part of Dawson range, comprising Hasler, Feuz and Michel peaks.
			By a lady. 1904	Miss Gertrude E. Benham.				
Dawson Glacier	In relation to Mt. Dawson.							Between Mts. Dawson and Fox.
Deville Mt.	By Rev. W. S. Green (Name changed to Selwyn).	11,013	1890	Topham and Forster.	1902	Topographical Survey.		Part of Dawson range, immediately east of Mt. Dawson.
Deville Mt.			By a lady. 1904	Miss Gertrude E. Benham.				
Deville Glacier and Neve.	In relation to Mt. Deville.		1890	Topham and Forster.	1890	Huber, Topham and Forster.		Between Mts. Topham and Deville (Selwyn) and extending southerly.
Dome, The.	By Aiken, Fay and Thompson.	9029	1897	H. B. Dixon, A. Michael, C. L. Noyes, C. E. Fay, J. R. Van Derlip, P. Sarbach (guide).				On west side of Asulkan valley, between Castor and The Rampart.
Donkin Mt.	By Rev. W. S. Green	9694	1890	H. W. Topham	1902	Topographical Survey.		At westerly extremity of Dawson range.
Donkin Pass	In relation to Mt. Donkin.	8556	1890	H. W. Topham		Huber, Topham and Forster.		Between Mts. Donkin and Dawson.
Donkin Glacier.	In relation to Mt. Donkin.		1890	H. W. Topham		Huber, Topham and Forster.		Below Donkin Pass on north side.
Duncan, Mt.	By Huber, Topham and Forster.	10,548						At head of Duncan river on west side of Beaver Duncan valley.
Duncan Glacier and Neve.	In relation to Mt. Duncan.							On north side Mt. Duncan, source of Duncan river.
Duncan River.								Flowing southerly from Duncan glacier to Duncan lake, near north end of Kootenay lake.

TABLE

Of data concerning some of the High Peaks and other points of interest in the Selkirk Range, B.C.—*Continued*

NOTE.—Where dashes are shown data is incomplete.

Nomenclature		Altitude in feet above Sea Level	First Ascent		Second Ascent		Where Situated.
Name.	Origin of Name.		Year.	Made by	Year.	Made by	
Eagle Peak	Rock resembling an eagle, mounted, seen on arrival.	9358	1893	S. E. S. Allen and W. D. Wilcox	1894	C. E. Fay and R. F. Curtis.	The centre peak of the Sir Donald range, immediately N. E. of Glacier House.
Easy Rock	By Topographical Survey.	9302	By a lady, 1901	Henrietta L. Tuzo			An isolated rock needle, rising from surrounding glaciers on west side of north branch of Illecillewaet river.
Fang Peak	By Professors Fay and Parker	10,982					Middle peak of Mt. Dawson.
Fleabone	By Topographical Survey	9001					South peak of Mt. McLean; situated in bend between Van Horne and Fish creeks.
Fish Creek	Translation of Indian name. Ichthyographic						Heads in Gothic and Van Horne glaciers and flows west and south to Arrow lake.
Flat Creek	Unknown						Creek joining Illecillewaet river from south between Ross peak and Illecillewaet stations.
Flat Creek Pass	In relation to Flat Creek.						Pass between headwaters of Flat creek and Fish creek.
Fleming Peak	By Topographical Survey.	10,370	1904	Miss Gertrude E. Benham.	1904	Miss Henrietta L. Tuzo.	Easterly of two centre peaks of Mt. Rogers.
Fox, Mt.	By Rev. W. S. Green	10,576	1890	H. W. Topham.	1893	Rev. H. P. Nicholls, S. E. S. Allen and C. S. Thompson.	Most northerly peak of Dawson range.

Fox Glacier	In relation to Mt. Fox							Below Mts. Fox and Selwyn on east side.
Gerkie Creek	In relation to Gerkie Glacier							Main source of Fish creek, flows from Gerkie glacier.
Gerkie Glacier	By Rev. W. S. Green		1888	Rev. W. S. Green and Rev. H Swanzy.	1890	H. W. Topham..		Southern outflow of Illecillewaet neve.
Glacier Circle	By Huber, Topham and Forster.		1890	H. W. Topham..	1890	Huber, Topham and Forster.		Surrounded by Mts. Topham, Selwyn (Deville), Fox and Macoun
Glacier Court	By members of Appalachian Club.	7119	1888	Rev. W. S. Green and Rev. H Swanzy.	1890	Huber and Sulzer		Between Illecillewaet glacier and Asulkan creek, extending northerly to stream from glacier.
Glacier Station	By C. P. R. Co.	Rail head, 1095						On C P.R. at westerly extremity of Rogers pass.
Grand Glacier	By Huber, Topham and Forster.		1890	Huber, Topham and Forster.				On west side of Beaver valley between Mt. Sugar Loaf and Beaver Overlook.
Grand Mountain	By Topographical Survey.	10,832						At head of and dividing Grand glaciers.
Grant Peak	By Topographical Survey.	10,216	1904	Miss Gertrude E Benham.	1904	Miss Henrietta L. Tuzo.		Westerly of two central peaks of Mt. Rogers.
Grizzly Creek	Unknown							Joins Illecillewaet river from south, eight miles east of Revelstoke.
Green, Mt.	After the Rev. W. S. Green.	8860						On west side of Loop creek above Green's glacier.
Green's Glacier	By Topographical Survey		1888	Rev. W. S. Green and Rev. H Swanzy.				On west side of Loop creek between Mt. Bonney and Mt. Green
Grizzly, Mt.	Unknown	9961	1901	Rev. J. E. Bashnell, A Eggers	1901	Topographical Survey.		Peak of the Hermit range on north side of Bear creek
Grizzly Creek	Unknown							Joins Beaver river from the east three and a half miles south of Bear Creek station.
Hunter Peak	By Professor Fay and Parker.	11,113	1879	C. E. Fay and H. C. Parker, guided C Hunter and E. Foye.	1901	E. S. Comstock.		Highest point of Dawson range and most easterly point of Mt. Dawson.
Hermit Range	Intermediate Peaks Hermit to Mt. Tupper	10,156						On north side of Rogers pass and Bear creek extending from Mountain creek to Cariboo creek

TABLE

Of data concerning some of the High Peaks and other points of interest in the Selkirk Range, B.C. *Continued.*

NOTE.—Where dashes are shown data is incomplete.

Nomenclature:		Altitude in feet above Sea Level.	First Ascent.		Second Ascent.		Where Situated.
Name.	Origin of Name.		Year.	Made by	Year.	Made by	
Hermit, Mt.	By Order in Council.	10,194	1904	Rev. J. C. Herdman, Rev. S. H. Grey, Rev. A. M. Gordon.	.....	.	A prominent peak of the Hermit range lying between Swiss peak, Mt. Shaughnessy and Mt. Tupper
Hermit, The	From its resemblance thereto.	8887	.....	.....	. .		Rock figures on Mt. Tupper resembling a hermit with a dog lying at his feet.
Hermit Crest	By Topographical Survey.	9010	1901	Topographical Survey.	. .		A rock crest bounding the Tupper glacier on the northeast between Hermit Mt. and Mt. Tupper. Overlooks the Beaver valley
Hermit Creek (Van Horne Ck.)	In relation to the Van Horne Glacier.	...	...	.....	...		Together with Goikie creek forms main source of Fishercreek. Heads in Van Horne glacier between Mts. Purity and McBean.
Ishbyosomus	By Mrs Chas Schaffer	7600	...	...	..	.....	Rising at the head of the Asulkan valley from the snows of the Asulkan glacier near its northern base. To the east of trail.
Illecillewaet Glacier and Névé	In relation to the Illecillewaet River.	Lowest crest of Pass 8400	1888	Rev. W. S. Green and Rev. H. Swanzy.	1890	Harold W. Topham.	Immediately south and west of Mt. Sir Donald and east of Asulkan creek.
Illecillewaet River	By Walter Moberly from the Indian meaning "Salt water."	.	1865	Walter Moberly.	1881	Major Rogers & Albert Rogers.	Rises in the Illecillewaet glacier and joins the Columbia at Revelstoke. The north branch rises near the headwaters of Downie creek.
Illecillewaet Station	By C. P. R. Co.	Rail head, 2710			.	.	On line of C.P.R. six and a half miles east of Albert Canyon station.

Incomappleux River.	By Kootenay Indians meaning "Fish River."						Heads in Geikie and Van Horne glaciers and flows west and south to northeast arm of Upper Arrow lake.
Jeopardy Slide.	Local name						On south side of Flat creek pass and west side of Fish creek. A tract swept clean by avalanches
Jove, Mt.	By Topographical Survey.	9176					The mass on west side of Asulkan creek, comprising Castor, Pollux and Leda.
Kipatrick, Mt.	By Topographical Survey.	10,624					A peak of the Purity range lying immediately west of Mt. Wheeler.
Leda	By Topographical Survey.	9133					Most southerly peak of the mass named Mt. Jove.
Lily Glacier and Neve.	By Rev. W. S. Green		1888	Rev. W. S. Green and Rev. H. Swanzy.	1895	Abbot, Fay and Thompson.	Between the Dome and Rampart on the east and Mt. Swanzy on the west.
Lily Col	By Rev. W. S. Green	8228	1888	Rev. W. S. Green and Rev. H. Swanzy.	1895	Abbot, Fay and Thompson.	The snow col between Lily and Swanzy glaciers.
Lookout, Mt.	Unknown	8219					Rocky crest rising from the snows of the Illecillewaet neve immediately southeast of Glacier crest.
Loop Creek	By Rev. W. S. Green		1888	Rev. W. S. Green and Rev. H. Swanzy.			Stream joining the Illecillewaet from the south. Drains the Bonney, Lily and Green glaciers.
Lookout Mining Camp and Station.	Unknown	Rail level, 2961					Abandoned Mining Camp two and a half miles east of Illecillewaet station, on C. P. R.
Macdonald, Mt.	By Order in Council	9482	Unknown	Unknown	1903	Rev. Dr. Herdman.	Most northeasterly peak of the Sir Donald range. Forms southern wall of Rogers pass
Marion, Mt.	By Rev. W. S. Green	9288	1902	Rev. J. C. Herdman.			On the south end of Illecillewaet neve overlooking Beaver valley.
Macoun, Mt.	By Order in Council	8964	1886	J. J. McArthur and Otto J. Klotz.			Immediately east of the junction of the Illecillewaet and Columbian rivers.
Marion Lake	By Rev. W. S. Green	5666					On north base of Mt. Abbott, above Glacier House.

TABLE

Of data concerning some of the High Peaks and other points of interest in the Selkirk Range, B.C.—*Continued.*

NOTE.—Where dashes are shown data is incomplete.

Nomenclature		Altitude in feet above Sea Level.	First Ascent		Second Ascent		Where Situated
Name.	Origin of Name.		Year.	Made by	Year.	Made by	
Macoun, Mt.	By Topographical Survey.	9,501					Between Van Horne and Fish creeks.
McDougal Creek	Unknown.						A tributary to Fish creek from the west.
McNeill, Mt.	After Lt. Van President of C.P.R.	8745					On west side of Beaver river valley between Mountain and Albert creeks.
Michael Peak	Topographical Survey.	10,034					Most westerly point of Mt. Dawson.
[a]Mons Glacier (The Bishops Glacier).	In relation to the original name of The Bishops' Range.		1890	H. W. Topham	1890	Huber, Topham and Forster.	Flowing between Dawson range and The Bishops range.
Mons Creek	In relation to The Bishops' Glacier.						Flowing from The Bishops glacier.
Moose Creek	Local name.						Name changed to Albert creek. Joins Illecillewaet river at Albert Canyon village.
Mountain Creek	Local name.						Joins Beaver River from the west half way between Beavermouth and Bear Creek stations.
Sugarloaf	A prominent rock figure resembling The Little Chief.	7737	1901	Topographical Survey.			South eastern spur from Mt. Cheops.

[a] Mons Glacier, changed to The Bishops Glacier.

North Branch Illecillewaet River	By Walter Moberly		1865	Walter Moberly.			A tributary to the Illecillewaet river from the north. Joins at Albert Canyon village.
Observation Point	By C. P. R. Co	5730					Point on north face of Mt. Abbott near Marion lake.
Oliver, Mt.	By Topographical Survey	8879	1902	Topographical Survey.			North of Fish creek and immediately east of Flat creek pass.
Overlook, The	By Prof. C. E. Fay	7950					Point overlooking the Illecillewaet glacier. Extends southerly between Uto and Eagle peaks.
Beaver, Mt.	By Topographical Survey	9419					On west side of Beaver river valley between Alder and Six Mile creeks
Parker Rock	By Rev. W. S. Green	7873	1888	Rev. W. S. Green and Rev. H. Swanzy.			A prominent rock rising at the eastern edge of the ice fall of the Illecillewaet glacier.
Pollux Pk.	By Abbot, Fay and Thompson	9176	1897	H. B. Dixon, A. Michael, C. E. Fay, C. L. Noyes, J. E. VanDerlip, P. Sarbachgunde-	1902	Topographical Survey.	The centre peak of Mt. Dove on west side of Asulkan pass
Prairie Hills	Local name						Along the east side of the Beaver River north of Grizzly creek
Purity, Mt.	By H. W. Topham	10,467	1890	Heber Topham and Forster.	1902	Topographical Survey.	Most westerly peak of Purity range situated between the head waters of Van Horne and Battle creeks
Purity Range	By Topographical Survey	11,023					Extending from Mt. Purity on the west to Grand Mt. on the east.
Rampart, The	By Abbot, Fay and Thompson	8476	1896	Abbot, Fay and Thompson.			On west side of Asulkan valley between Mt. Afton and The Dome
Rogers, Mt.	By Carl Sulzer	10,520					Highest point of Hermit range immediately south of Rogers pass
Rogers Peak	By Carl Sulzer	10,536	1896	Abbot, Thompson and Little.	1902	Topographical Survey.	Western and highest peak of Mt. Rogers.
Rogers Glacier	In ascending to Mt. Rogers		By a lady 1904	Miss Gertrude E. Benham.	1904	Miss Henrietta L. Tuzo.	Immediately east of and below Mt. Rogers.

TABLE

Of data concerning some of the High Peaks and other points of interest in the Selkirk Range, B.C.—*Continued*

Note.—Where dashes are shown data is incomplete.

Nomenclature		Altitude in Feet Above Sea Level.	First Ascent		Second Ascent		Where Situated
Name	Origin of Name		Year	Made by	Year.	Made by	
Rogers Pass	After Major Rogers the discoverer.	Rail level, 4251	1881	Major Rogers & Albert Rogers	1883	Major Rogers and party.	Pass over the Selkirk summit lying between Mts Macdonell and Tupper.
Rogers Peak Stn.	By C. P. Ry. Co.	Rail level, 4300					Half a mile east of Rogers pass summit.
Rose Peak	After James Rose, who has a ranch at mouth of railway tote road to Illecillewaet.	7718	1896	C. T. Little and C. S. Thompson.			On west side of Loop creek at its junction with the Illecillewaet river.
Rose Peak Stn.	By C. P. Ry. Co.	3846					A siding on the railway, six and a half miles west of Glacier House.
Sisir Point Islands	Named from its use as a camping place for Topographers.						Rocks rising from the Illecillewaet glacier immediately west of Perley rock.
Sapphire Col.	By Professor G. F. Ede.	8488	1895	Abbot, Fay and Thompson.	1897	H. E. Dixon, A. Michael, C. E. Fay, C. L. Noyes, J. R. VanDerlip, P. Sarbach(guide)	The snow neck between Castor and The Dome.
Sierra, Mt.							See Mt. Deville, page 377.
Silcox, Mt.	By Topographical survey.	9043	1909	Fred. A. Michael.	1914	Miss Gertrude E. Benham.	A peak of the Hermit range between Mts. Rogers & Mt. Grenfell.
Silver Creek.	Local name.						Joins Illecillewaet river two miles west of Albert Canyon village.

Sir Donald, Mt.	By Order in Council (Formerly Syndicate Peak)	10,808		1890	Huber & Sulzer, H. Cooper (porter).	1899	F. Lepannez Rimguet, H. Cordes, guides Hasler & Feuz.	Highest peak of Sir Donald range immediately west of Glacier House.
				1901	By a lady, Mrs. E. Berens.	1902	By a lady, Miss Marion Raymond	
Sir Donald Glacier	By Rev. W. S. Green							Flowing to the Beaver valley on the south east face of Mt. Sir Donald.
Six Mile Creek and Station	Local name							A siding on the C. P. R. The creek joins the Beaver river from the west 5¾ miles northerly from Beavermouth station.
Slide Creek	Named by E. B. Hermann in 1898.							Joins Fish creek from west immediately south of Flat creek pass.
Stuart, Mt.	By Topographical Survey.	9517						South of the railway between Mt. Bonney and Flat creek.
Stony Creek	Local name	Rail level, at crossing 3501						Joins Beaver River from the west 1¾ miles north of Bear Creek station.
Sugar Loaf, Mt.	By Huber, Topham and Forster	10,782		1890	Huber, Topham and Forster.			Immediately west of Beaver river and south of Grand glaciers.
Surprise Creek	By C. P. Ry. Engineers							Joining Beaver river from the west between Cedar station and Stony creek.
Swanzy, Mt.	By Abbot, Fay and Thompson.	9562		1900	A. Michael and Sidney Spencer	1902	Topographical Survey.	At head of Loop creek between Mt. Bonney and The Dome.
Swanzy Glacier	By Abbot, Fay and Thompson.							Flowing south to Fish creek between Castor and Pollux and Mt. Swanzy.
Swiss Peak	By Carl Sulzer	10,515		1890	Carl Sulzer	1901	Topographical Survey.	The highest sharp peak of Mt. Rogers.
			By a lady 1904	Miss Gertrude E. Benham.	1904	Miss Henrietta L. Tuzo.		
Swiss Glacier	By Topographical Survey.			1890	Carl Sulzer	1896	Abbot, Thompson & Little	Below Rogers and Swiss peaks on the south side.
Terminal Peak	Subscribed for Grizzly Peak, applied elsewhere.	9773		1885	Rev. W. S. Green and Rev. Henry Swanzy.	1899	F. Lepannez Rimguet and H. Cordes, Huber & Feuz guides.	A little sharp peak on the south west shoulder of Mt. Sir Donald. Directly above the Uniloa glacier.

TABLE

Of data concerning some of the High Peaks and other points of interest in the Selkirk Range, B.C. — *Concluded.*

NOTE.—Where dashes are shown data is incomplete.

Nomenclature		Altitude in feet above Sea Level.	First Ascent		Second Ascent		Where Situated
Name	Origin of Name		Year.	Made by	Year	Made by	
Tupper Lake		Ranges from 6980 to 7360					
Lancaster Peak	By Topographical Survey	9445					The northerly peak of Mt. McLean, situated between Van Horne and Fish creeks.
Tupper, Mt.	By Topographical Survey	9478					On the west side of the Beaver valley immediately south of Mt. Macoun.
Twin Peaks	By Topographical Survey	10,216					The eastern group of peaks of Mt. Rogers.
Tupper, Mt.	By Order in Council	9222					On north side of Rogers pass, opposite Mt. Macdonald.
Tupper Crest	In relation to Mt. Tupper	8958	1899	Carl Sulzer			Shoulder extending north westerly from summit of Mt. Tupper to Swiss glacier.
Tupper Glacier	In relation to Mt. Tupper		1901	Topographical Survey	1902	Topographical Survey	Flows to Beaver River valley along north face of Mt. Tupper.
Twin Buttes	Local name	8084 and 7718	1886	J. J. McArthur and O. J. Klotz			Name changed from Twin Buttes to Mts. Mackenzie and Tilley. Later found that only one peak existed which was named Mt. Mackenzie.
Twin Buttes Station	B.C.P. Ry. Co.	Existed 1907					A siding on the railway ten miles west of Albert Canyon station.

Twin Creeks	Local name	Rail level, 1954			Joining the Illecillewaet river from the south about two miles east of Twin Butte siding.
Twintop Rocks, The	By Topographical Survey	Summit, 9345			On southerly shoulder from summit of Mt. Fox. A very peculiar stratification in the Dawson amphitheatre.
Uross Mason, Mt	By Topographical Survey. (Formerly 'Ray.')	8939	1902	Topographical Survey.	A mountain of the Hermit range at north side of the divide between Bear and Cougar creeks.
Uross Minor, Mt	By Topographical Survey. (Formerly 'Sulker.')	9926			A mountain of the Hermit range on north side of Bear creek immediately west of Mt. Grizzly.
Uto Peak	By Professor C. E. Fay.	9610	1890	Huber and Sulzer	A peak of the Sir Donald range immediately north west of Mt. Sir Donald.
Uto Glacier	In relation to Uto Peak.				Flowing to Beaver valley on north side of Uto peak.
Van Horne Glacier	By Rev. W. S. Green				A glacier on the west side of Mt. Purity, the source of Van Horne creek.
Vaux Glacier	By Topographical Survey. (Formerly named 'Green Glacier.')		1890	Huber and Sulzer	A small glacier on the western face of Mt. Sir Donald.
Wheeler, Mt	By Topographical Survey.	11,023	1902	Topographical Survey.	A mountain of the Purity range fronting the Deville névé.
Wind Tower, The	By Topographical Survey.	8080			A fantastic group of rocks on the north western shoulder from the summit of Mt. Fox.

NOTE.—The following have been omitted in the foregoing table.

Corbin, Pte.	After A. pioneer to Beg. Illecillewaet village.	8892			Between the north branch of Illecillewaet and Carbon creek.
Corbin Pass	In relation to Mt. Dawson.	9830			Immediately north of Illecillewaet village. Pass travelled by Corbin mine.

APPENDICES

APPENDIX A.

ALTITUDES IN CANADA, by James White, F.R.G.S., Geographer to the Department of the Interior. (Extract.)

Miles from Montreal.	Canadian Pacific Railway.	Elevation.
2,263·7	Calgary Station	3,428
2,270·3	Bow River, water, 3,492; bed, 3,484; rail	3,496
2,273·0	Keith Station	3,503
2,286·5	Cochrane Station	3,749
2,289·2	Midford Station	3,792
2,289·4	Bow River, high water, 3,695; low water, 3,692; bed, 3,687; rail	3,715
2,296·7	Radnor Station	3,886
2,305·2	Morley Station	4,067
2,315·4	Kananaskis River, water, 4,160; bed, 4,157; rail	4,202
2,316·6	Bow River, water, 4,188; rail	4,206
2,317·7	Kananaskis Station	4,220
2,321·6	Lac des Arcs (Bow River), water, 4,217; rail	4,232
2,325·5	'The Gap' siding	4,252
2,326·2	Bow River, water, 4,231; rail	4,256
2,330·8	Canmore Station	4,284
2,336·6	Bow River, high water, 4,352; low water, 4,349; rail	4,350
2,337·6	" 4,370; " 4,367; "	4,378
2,338·4	Duthil Station	4,387
2,340·9	Anthracite Station	4,490
2,341·7	Cascade River, bed, 4,520; rail	4,525
2,342·9	Summit, rail	4,573
2,345·4	Banff Station	4,721
2,345·7	Forty-Mile Brook, water, 4,512; bed, 4,511; rail	4,548
2,351·6	Cascade Station	4,587
2,352·3	Minnehos Lake, water, 4,532; rail	4,738
2,358·2	Bow River, water, 4,595; rail	4,601
2,360·1	Johnson Brook, high water, 4,636; low water, 4,633; rail	4,641
2,362·4	Castle Mountain Station	4,660
2,370·0	Eldon Station	4,847
2,372·0	Baker Brook, bed, 4,859; rail	4,864
2,377·6	Pipestone Brook, water, 4,956; bed, 4,954; rail	4,976
2,379·7	North branch Bow River, bed, 5,025; rail	5,038
2,380·0	Laggan Station	5,087
2,381·2	South branch Bow River, water, 5,054; bed, 5,051; rail	5,064
2,381·4	Bath Creek, bed, 5,065; rail	5,073
2,385·8	Summit of Kicking Horse Pass, main divide, Rocky Mountains (highest point on the Canadian Pacific Railway)	5,329
2,386·8	Summit Lake, water	5,317
2,386·1	Stephen Station	5,321
2,388·5	Hector Station	5,297
2,388·6	Kicking Horse Lake, water	5,294
2,389·1	Kicking Horse River, bed, 5,193; rail	5,204
2,393·1	Mount Stephen Tunnel, rail	4,544
2,396·2	Field Station	4,184
2,398·5	'Muskeg' Summit, rail	4,172

ALTITUDES IN CANADA—*Concluded.*

Miles from Montreal	Canadian Pacific Railway	Elevation
2,401·6	Ottertail Brook, bed, 3,752; rail	3,804
2,403·4	Ottertail Station	3,696
2,404·5	Kicking Horse River, bed, 3,674; rail	3,694
2,410·2	Leanchoil Station	3,579
2,412·2	Summit ground, 3,681; rail	3,677
2,416·4	Kicking Horse River, water, 3,306; bed, 3,295; rail	3,318
2,417·9	Palliser Station	3,262
2,423·2	Ogilvie Station	2,991
2,430·8	Kicking Horse River, water, 2,697; rail	2,718
2,430·2	Golden Station	2,760
2,430·2	Columbia River at mouth of Kicking Horse River, water	2,707
2,432·0	Bay of Columbia River, water, 2,704; rail	2,761
2,436·8	Meadow Station	2,746
2,439·6	Blaeberry River, bed, 2,753; rail	2,774
2,446·2	Donald Station (by levels from Lake Superior)	2,674
2,446·2	(by levels from Pacific Ocean)	2,586
2,447·9	Columbia River, 1st crossing high water, 2,580; low water, 2,510; bed, 2,507; rail	2,702
2,448·5	Summit	5,901
2,449·9	Ohl Mon Creek, bed, 2,529; rail	2,594
2,451·2	Redpaths Station	2,540
2,458·4	Beavermouth Station	2,433
2,461·3	Beaver River, bed, 2,529; rail	2,539
2,463·9	Stoney Creek Station	2,847
2,468·9	Cedar Station	3,188
2,471·7	Stony Creek, bed, 3,224; rail	3,301
2,473·2	Bear Creek Station	3,073
2,475·1	Cascade Creek, bed, 3,859; rail	3,904
2,478·2	Rogers Pass Station	4,094
2,480·0	Summit of Rogers Pass, Selkirk Mountains, ground, 4,361; rail	4,354
2,482·3	Glacier Station	4,095
2,485·8	Illecillewaet River, bed, 3,689; rail	3,744
2,487·0	— 3,674; —	3,709
2,489·0	Ross Peak Station	3,456
2,492·7	Illecillewaet River, bed, 3,096; rail	3,136
2,497·8	— 2,729; —	2,758
2,497·9	Illecillewaet Station	2,710
2,501·1	Illecillewaet River, bed, 2,422; rail	2,484
2,504·5	Albert Canyon Station	2,507
2,510·5	Twin Butte Creek, bed, 1,880; rail	4,054
2,514·3	Twin Butte Station	1,987
2,518·4	Gamsby Creek, high water, 1,670; bed, 1,587; rail	1,666
2,521·8	Illecillewaet River, water, 1,914; bed, 1,593; rail	1,655
2,526·1	Revelstoke, junction with Arrow Lake branch	1,668
2,527·1	Columbia River, extreme high water, 1,486; low water, 1,437; bed, 1,424; rail	1,481

(See also pages in Vol. II.)

APPENDIX B.

NOTES ON THE NATURAL HISTORY OF THE SELKIRKS AND ADJACENT MOUNTAINS.

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Botanist and Naturalist to the Dominion of Canada.

MAMMALS.

Since the building of the Canadian Pacific railway the larger mammals of the mountains have become fewer and have retired into the deeper recesses within them or to the more inaccessible summits. Bears, both black (*Ursus americanus*) and grizzly (*Ursus ferox*) were numerous at the summit in 1885, and one of the latter pounced upon a man while drinking from a creek on the slope of Avalanche mountain in August of that year. The man and a boy, his companion, had been gathering berries and each carried a gun. The man lay down to drink with more ease, when a large Silver Tip rushed from the bushes upon him. The boy fired two shots into the bear, but it still held the man. He then crawled up and pulled the man's gun—a Winchester—from under the bear and fired six shots more before he killed it. One shot had gone through the bear's heart, but it was one in the head that killed it. When the skin was taken off, the flesh side seemed to be full of holes. The writer and his son always carried a gun, with one barrel loaded with buckshot intended for bears, when climbing amongst the mountains, but were never attacked, and never became the aggressors, for obvious reasons. Bears can still be found, but they are careful to keep out of sight.

It may be mentioned, in this connection, that black bears are very fond of the roots of the western skunk cabbage (*Lysichitus Kamtschatcense*), which is their favourite food in the spring and probably in other parts of the year. On Vancouver island, at this season, they are always hunted with great success, as they are invariably found feeding on the roots of the plant. As the valleys of the Beaver and Illecillewaet rivers are filled, in many places, with skunk cabbage, we may be quite certain that bears in large numbers will be found almost

at any time in these localities. When the huckleberry (*Vaccinium*) is at maturity, they will be found on the mountain slopes, for it then forms their staple food.

The Caribou (*Rangifer caribou*), and Mountain Goat (*Haplocerus montanus*) are also growing scarce, but with a guide who is a sportsman and not afraid of a long walk, good sport can still be had. Mountain goats are easily found, and if the hunters understand their habits, they are easily taken. They delight in the high meadows above the timber, and indeed it is above the timber that both animals will be found in summer and autumn. We found caribou and goats quite plentiful on the Gold range, not far from Griffin lake, and easily obtained.

The Mule Deer (*Cervus macrotis*) is still plentiful on the lower slopes by the Columbia, and ten years ago was so tame that a person could approach quite close without causing alarm. Now, it is pitiful to see the change, and the sight of man causes it to fly in an access of fear.

The large Marmot or Whistler (*Arctomys Columbianus*) has his home high up, generally above timber line, and loves to bask in the sun on a flat rock with a shallow pool near by. Their dwellings are among broken rocks at the base of a slope, and here they repose by the hour, lying in the sun or wallowing in a shallow pool. All taken were extremely fat and fit for hibernation. They often deceive the traveller by uttering a long-drawn whistle, and at first the writer used to answer it, believing it to be a human call. A large colony have their abode among the débris of the southern base of Mount Cheops and on the Illecillewaet side. A dark coloured form has been taken there, which by some has been considered a different species. Their habits can be easily studied, if the observer places himself on the slope above and keeps quiet. He will soon discover that silence only accompanies his blundering steps, and that, if he be quiet and effaces himself, the mountain will become alive both with noise and movement. They unhesitatingly eat grass and herbs in quantities and, when dried, take them to their holes and either eat them in winter or, what is more likely, make of them warm beds for their long winter sleep.

There are other marmots, which are more probably Spermophiles, that are found in colonies on the lower slopes of the mountains, and other species again that inhabit the prairie. The common mountain species is Say's squirrel (*Spermophilus lateralis*), which is a common inhabitant of the wooded slopes and might pass for a large chipmunk on account of its size. It has a broad white stripe, which is bordered with a band of brownish black along its sides. Its head is large and its legs shorter than those of a squirrel.

Another species is Parry's marmot (*Spermophilus Parryi*), which may be found in the Selkirks as it is of wide distribution. In general colour it is deep yellowish gray. It dwells in colonies in open

places in the mountains. The most western colony known to the writer is one in the old town plot of Castle Mountain, west of Banff.

The most remarkable animal in the mountains is the Little Chief Hare (*Lagomys princeps*), which is found amongst the loose stones at the base of all slopes up to 7,000 feet or more. The writer has never found its burrows, but has found them living amongst loose stones at Kamloops, Sicamous and to the timber limit in the Selkirks and Rocky mountains. There is likely more than one species, as an animal with its habits has hardly ever such a range in altitude. The abodes of this little animal can always be recognized by the neat heaps of herbs and flowers that are to be seen in all directions, which are popularly known as 'the Pika's hay.' Although called a hare, it is quite different in structure, though in general appearance it resembles the young of that genus.

The yellow-haired porcupine is occasionally met with, and squirrels are numerous in many places, with chipmunks on the highest rocky points above the general snow-line. There are also numerous species of mice and shrews that are seldom seen, unless hunted for; but one species of rat is very often in evidence around old camps, and often causes loss and discomfort to climbers and hunters. I refer to the bush-tailed rat (*Neotoma Drummondii*). This species is found all through the mountains and is to the traveller what the wolverine is to the trapper. In 1875, while we camped at the Rocky Mountain canyon of the Peace river, in latitude 56°, Dr. Selwyn, who was the leader of the party, left his boots at the side of the tent when he retired to rest. In the morning they had all disappeared but the soles. Numerous small articles had disappeared from around the camp. While exploring the neighbourhood during the day, the writer discovered the nest of the rat, recovered the missing articles and had a fight with a porcupine on the same ledge with the nest. The next morning, two dead rats were found close to camp, and, when taking off their skins, it was found that the boots, with the assistance of dried apples, had been too much for them.

Ten years later, when examining a nest in a deserted hut at Castle Mountain, near Banff, the writer found at least two bushels of stuff. Prominent amongst it were knives, forks, spoons, shaving brushes, hair brushes, razors, broken delf and small tinware of all descriptions. Why they carry off and put such things in their nest is still a *puzzle* to the writer, but, like the jackdaw and certain individuals of the human species, they may be troubled with kleptomania and cannot resist the desire to acquire.

In the Beaver and Columbia river valleys there were formerly, and may be still, numerous martens and fisher, as well as beaver, and trappers did well. Now it may be changed, but muskrat should still be plentiful in the valley of Beaver creek. Both mink and ermine (weasels) can be caught, though seldom seen. The naturalist who has a few days to spare, can learn much about the numerous animals

by making the Glacier Hotel his headquarters and taking leisurely trips up the mountains in the vicinity.

BIRDS.

A very prominent feature in the Selkirks is the large number of resident grouse that are found from base to summit. Although they may be scarce to the casual traveller, they are not so in reality. They are represented by six species, one of which, the White-tailed Ptarmigan (*Lagopus leucurus*), occupies all the summits above the timber-line. This species is truly alpine in its habits, and retires into the upper line of timber in the winter, where it remains in comfort until the return of spring.

The genus Dendragapus is represented by Franklin's Grouse (*Dendragapus franklinii*), just immediately below the home of the Ptarmigan. This species is the real 'fool-hen' of the 'prospector', though it and Richardson's Grouse (*Dendragapus richardsonii*) are both called by that name, as they sit in the trees until they are knocked off with sticks, and hence a lone wanderer in the mountains has many a savoury meal without expending any ammunition. The other species of this genus is the Dusky or Sooty Grouse (*Dendragapus fuliginosus*) and may be distinguished from the other two species by the tail being tipped with a band of ashy gray. Richardson's Grouse is without the tail-band and is of a uniform dusky colour and often called Blue Grouse on that account. The male of Franklin's Grouse is a beautiful bird and is well distinguished by its black tail, sometimes tipped with pure white.

Ruffed Grouse are plentiful around the base of the mountains, and nest in great numbers in the burnt timber by the railway and along the Columbia. Ruffed Grouse (*Bonasa umbellus togata*) is the form most frequently found, but some naturalists, owing to the colour of the feathers, contend there are no less than three forms. At any rate, the 'partridge' is well represented in all the wooded country from the Atlantic to the Pacific.

Many species of ducks may be found along the Columbia on both sides of the mountains, spring and fall. The only two species that nest in numbers are the 'Saw bills' (Mergansers): the Hooded Merganser (*Lophodytes cucullatus*) and the American Merganser (*Merganser americanus*). These two species are found in all suitable localities and usually bring forth large sittings every year. The only other mountain duck known to the writer is the Harlequin Duck (*Histrionicus histrionicus*). This species has been found breeding at Lake Wapta and is doubtless to be found about the sources of Beaver creek and the Bow river.

When the Canadian Pacific railway reached Golden in 1884, large numbers of Canada geese and various species of ducks bred in the marshes below. They returned in 1885, but soon left the locality

Grus sp., *Dendrocygna viduata viduata* (Linn.)

altogether. Numerous waders were found along the lakes and streams and a few remained to breed. Wilson's Snipe (*Gallinago delicata*) bred as late as 1890 close to the water-tank at Revelstoke and was then a common species, and is so up to the present.

Eagles are not a feature of the mountains, but both species are occasionally seen soaring far overhead. The Bald-headed Eagle (*Haliæetus leucocephalus*) can be told in all states by the tarsus being naked all around for the lower third, and to the base of the toes, the Golden Eagle (*Aquila chrysaetos*), by the tarsus being densely feathered all around down to the base of the toes.

Crows (*Corvus americanus*) and Ravens (*Corvus cauu principalis*) are scattered through the mountains, the former often in large numbers, the latter quite rare and only seen in pairs or singly.

There is one remarkable and obtrusive bird in the mountains which prefers to live around camps and eat garbage. It is often called the Whiskey Jack, but is altogether a different bird. It is certainly related to it as well as to the crow, but it is a nutcracker and makes its home in the coniferous woods at considerable elevations. In Canada it is called Clarke's Crow (*Picicorvus columbianus*), and well deserves the name of crow, as the writer found it with crows cleaning up the old camps in the mountains along the Canadian Pacific railway in 1885. There is another very attractive bird that may be seen in numbers at times along the railway. I refer to the black-headed Jay (*Cyanocitta stelleri annectens*). This beautiful bird is closely related to Steller's Jay of the Pacific coast, but may be easily distinguished from it by a whitish spot over the eye. The Rocky Mountain Whiskey Jack (*Perisoreus canadensis capitalis*) is not wanting, but is a much smaller bird than Clarke's Crow, and the two are often confounded.

The Water Ousel or Dipper (*Cinclus mexicanus*) is a characteristic bird of all the mountain brooks and deep gorges where the water descends by a series of leaps from higher to lower levels. The bird itself is short and compact and of a uniform grayish slate colour. Its nest is a bulky object, generally placed upon a ledge behind a small sheet of water. The casual observer will pass the nest as being merely a lump of moss, as the outside is dripping and almost as green as the surrounding moss. The nest is dome-shaped and has the entrance on the side away from the water, and within it is dry and warm. The writer has found the nest on the "stringers" of a bridge over a mountain torrent on Vancouver Island, so that, like the swallow, it builds its house to suit its environment. Speaking of swallows, reminds me that the Violet-green Swallow (*Tachycineta thalassina*), one of the most beautiful swallows in America, breeds in the cliffs of the Columbia near the mouth of Beaver creek, and other interesting species can be seen almost anywhere in the mountains. The Cliff Swallow (*Petrochelidon lunifrons*) seems to adapt itself to changed conditions at once. The first year water-tanks were erected

on the line of the railway, they deserted the river cliffs and built under the eaves of the tanks, and at present throughout the Territories, the cliffs are deserted and barns and other buildings substituted.

There are numerous thrushes, sparrows, warblers, woodpeckers and other small birds that enliven the woods and thickets with their songs, but they are of more interest to the naturalist than to the general reader, and our space is limited. Speaking of birds generally, it may be said that they learn largely from experience where to breed. It is commonly supposed that all wild animals, including birds, dread the advent of man and leave his vicinity. This is not so in respect to game birds. They dread the fox and cayote more than man, and the writer has found that within the last twelve years game birds, and even small birds, are gradually nesting in greater numbers around settlements. The reason is not far to seek. Birds of prey and carnivorous animals are not safe in these neighbourhoods, and this the birds soon learn and so make their homes near man in safety. Boys away from town are not egg-destroyers, but strike at larger game.

FISH.

The leading fish in all our inland waters are species of Salmonidæ. The genera Salmo, Salvalinus, and Oncorhynchus give us our trout and salmon. Of the genus Coregonus, our whitefish, one, the *Coregonus Williamsonii*, is improperly named 'Grayling' by miners and others.

In the Rocky mountains are three species of trout, which are respectively named the Great Lake Trout, the Bull Trout and the Rainbow Trout. The names given are applied in other districts to different species, so that the local name has no real significance.

The 'Rainbow Trout' or 'Cut-throat Trout' (*Salmo mykiss*) is the black-spotted trout of the Rocky mountains, whose waters enter the branches of the Saskatchewan. This form is found in the Bow river at Banff and on Old Man river, farther south. Passing the summit of the Rocky mountains and descending towards the Columbia, another black-spotted species is met with, named Steel-head or Gairdner's Trout (*Salmo gairdneri*). This species is found in the Columbia and all its tributaries, and hence in all the streams in the Selkirk mountains.

The Red-spotted Trout, Dolly Varden Trout or Bull Trout (*Salvalinus malma*) is the real Brook Trout of the mountains from the British Columbia boundary to Alaska. It is this species that gives rest to mountain fishing and real sport to the angler. Like its relative, the Brook Trout of the east, it is found in streams of all sizes, and, in consequence, weighs from a few ounces to over twelve pounds at the mouths of some of the northern rivers.

The Great Lake Trout (*Cristivomer namaycush*) and the Bluenose or Fraser River Salmon (*Oncorhynchus nerka*) are found in suitable

PARNASSIA EMEIGATA, KENT.

localities, the former chiefly in the large lakes, and the latter in the Columbia, all around the Big Bend. There seems to be more than one form in the Arrow lakes, as many small fish were taken in July that were just about ready to spawn.

The five fish mentioned above are all that need particular mention. The Cyprinidæ (minnows) and the Catostomidæ (suckers) are represented by many species, which largely serve as food for the Salmonidæ. Some of the species grow to a large size in the Columbia, and are eaten when no better fish can be obtained, but as a rule the flesh is too soft.

BOTANY.

Owing to the heavy snow-fall in the Selkirk range and the general humidity of its climate, there are few flowers in early summer. In July and August, however, the mountain slopes, the borders of the mountain brooks and the high meadows up to the snow-line are covered with multitudes of beautiful flowers. Although few species have sweet scents, the brightness of their colours attracts the eye and fires the mind with pleasant thoughts. To one who desires to look at the mountain flowers in their prime, the climbing on any mountain near the Selkirk summit in late July or early August will satisfy the most sceptical mind that in the recesses of the mountains are gardens unequalled for beauty by the pretentious ones of the city.

The mountain flowers may be called spring flowers, as a whole, because many of them, although commencing to flower on the lower slopes in June, continue flowering as the snow melts away, and late in August may be found close to the snow at an altitude of 5,000–6,000 feet and still coming into bloom. Of this class is the queen of flowers—the giant Dog's Tooth Violet or Adder Tongue (*Erythronium giganteum*), which follows the snow on the Gold range from April to late August, and is always fresh and young.

Every change in altitude gives a change in the flora, and in the following notes the species will be mentioned in detail just as they are liable to occur in an ascent from the railway to the snow-line. Rogers pass, owing to the great snow fall, has many high mountain species, but the pools in Beaver creek valley have many species of lower altitudes that are found almost, if not to the coast, on the Pacific side.

The Beaver and Illecillewaet valleys are, or were, filled with large trees, of which the Giant Cedar (*Thuya gigantea*) was the largest, often attaining a diameter of ten feet. The Cottonwood (*Populus balsamea*) was another mighty tree, while the spruce, of at least two kinds, covered the lower slopes of the mountains to and above the railway as it gradually ascended the mountain side from Six Mile creek to Rogers pass. Engelmann's Spruce (*Picea Engelmanni*) is the spruce of the Selkirks, and for beauty, as single trees or in groups, is unsurpassed in the mountains anywhere.

Around the Glacier Hotel and on the wooded slopes above, there are other species which clothe the mountain sides, forming a mixed forest, or in some places large areas of a single species. Two hemlocks are quite common: one, *Tsuga Mertensiana*, common on the west coast, is easily known by its small cones. The other, a rare and beautiful tree (*Tsuga Pattoniana*) is separated at once from its relative by the larger cone and its more graceful habit. This is the species I have seen used for decorative purposes in the Glacier Hotel. Douglas Fir (*Pseudotsuga Douglasii*) is also common and actually extends from the Pacific coast to near Calgary. Amongst the other forest growths are two firs, *Abies subalpina* and *amabilis*, which are very beautiful trees, more especially the latter, which, with *Tsuga Pattoniana* and *Pinus albicaulis*, form the last groups in the alpine slopes above 6,000 feet. Here, the fir will be found in groups with trees in all stages of growth, from those a foot high to aged patriarchs in all stages of decay.

On the lower mountain slopes and in the valleys and ravines there is a perfect tangle of undergrowth, and woe be to the man who gets on a log in Beaver creek valley and leaves it unintentionally for a clump of Devil's Club (*Panax horridus*): his experience will be so impressive that he will relate it with much unction at many a camp fire. In addition to the wounds caused by the spines of the Devil's Club, the fine sense of smell is frequently offended by a plant of tropical growth, appearing in great profusion in low, swampy spots—the western skunk cabbage (*Lysichiton Kamtschatcense*), already referred to as a staple food of the black bear during early spring. Owing to the descent of small avalanches and the weight of the soft snow, all the alders, willows and young birch are bent down so that they lie about breast high and prevent ascent where they are, and the descent through them on a wet day is extremely dangerous, owing to their slipperiness. It is best not to investigate the shrubs of the ravines too closely. Some of the shrubs, however, are very beautiful and produce flowers of great beauty, as the white-flowered Rhododendron (*Rhododendron albiflorum*) and the mountain heather (*Bryanthus empetriformis*) with pink flowers, and *B. glandulifera* with yellowish flowers. Another low-growing shrub, often called heather (*Cassiope tetragona*), is found mixed with the above, but it has white flowers like little bells.

Larger flowering shrubs are found on the lower slopes, and of these many are berry-bearing. The mountain ribes (*Ribes montigenum*) is conspicuous, with its bunches of white flowers and black fruit. The honeysuckle (*Lonicera Douglasii*) has purplish flowers and large, juicy, black berries. Species of Spiræa grow on the snow-slides with large umbels or spikes of pink or white flowers, and interwoven with these are many species of Vaccinium that furnish fruit for both man and beast. The most valuable fruit for man in the mountains is a large dark-coloured huckleberry (*Vaccinium myrtil-*

Spiranthes Romanzoffiana, Cham.

loides), and with it grows another with bluish fruit covered with a bloom, which is also very good, but puckers the mouth, when eaten in quantity. Another very fine fruit is a red or purplish huckleberry which grows on a low bush, under a foot high, but mostly only about six inches. It is named *Vaccinium Myrtillus* and is very common locally in the Rocky mountains.

Currants and gooseberries are not infrequent, but the fruit cannot be recommended. The same may be said of numerous other species which occur frequently on the slopes, but are not conspicuous for fruit or flower. The common raspberry (*Rubus Stegosus*) is plentiful at lower altitudes, but does not fruit well except on a sunny slope. It is found in the greatest profusion along either side of the railway track, on both the eastern and western slopes of the Selkirks, and particularly in the Columbia valley, along the Arrow Lakes branch. In close affinity to it is the Cap-berry (*Rubus Nutkanus*), which also grows beside it in the localities indicated. It is a white-flowering species with a rich deep crimson fruit that looks better than it tastes. The wild strawberry of the mountains, on the lower slopes and in the valleys of the Columbia and Beaver creek, is well worthy of cultivation and often grows in such quantities that a pailful could be gathered in a few minutes. Such places are numerous between Golden and Donald, on the east side of the Columbia, about 500 feet above the river. The procession of flowers begins as soon as the snow disappears in the river valleys and on the lower slopes, and continues throughout the summer. It is not uncommon to find the same flowers late in August that were flowering as spring beauties in the beginning of May, the cause being a difference in altitude. The Spring Beauty (*Claytonia sessilifolia*) of the mountains was found in flower on the site of Revelstoke on May 4th, 1890, and, the same year, was collected at Glacier on August 10th. In each case it was a spring flower. The *Erythronium giganteum*, or yellow Dog's Tooth Violet, as it is called, was in such profusion at Sicamous on April 2nd, 1889, that fine bouquets were placed in the dining-car. The same season this species was flowering in great abundance and producing fine flowers close to the Asulkan glacier as late as August 20th. In both cases it was a spring flower, coming after the melting of the snow.

Later in the season, the various species of Mimulus (Monkey flower) come into bloom, and the spring brooks on the mountain sides, both low down and high up, are gay with these lovely flowers. Two species—a large yellow-flowered one (*Mimulus luteus*) and a taller-growing and more robust species with pink or purplish flowers (*Mimulus Lewisii*) are noteworthy, as they are sure to be found where good water is abundant. On August 10th, 1889, the writer was wandering around the Gold range above Griffin lake, and at an altitude of 7,000 feet, came upon a small spring brook, bordered with Mimulus, which was murmuring on its way down the slope. By and by it ceased to murmur, and on examination, a ledge of rocks only a few inches high

was seen to protrude into the stream, and upon the extreme point was growing a large bunch of Mimulus; on this the water flowed, and, after a pause, took either to right or left, and the particles thus separated never met again, as one brook led into Eagle river and by the Thompson and Fraser to the ocean. The left-hand brook by a short course joined the Columbia and by it reached the Pacific at Portland. Bordering the same brooklets coming from the snow are many species of beautiful flowers, all of which are spring flowers, but may be found in bloom from early June to late August, according to altitude. The Crowfoot (Buttercup) family is well represented and numerous species are to be found at all altitudes. Two species of Columbine, a pale blue and a reddish-flowered one, are quite conspicuous. These are *Aquilegia brevistylis* (the blue-flowered one) and *A. flavescens* (the one with red or yellowish flowers). The Anemones are represented by three or more species, and one, the Western Alpine Anemone (*Anemone occidentalis*), is quite a prominent object, whether we consider its leaves, flowers or fruit.

The Mountain Marsh Marigold (*Caltha leptosepala*) and the American Globe flower (*Trollius laxus*) border many brooks near the snow, and these, with numerous Saxifrages, Violets and other beautiful flowers, make the mountain meadows and higher slopes a real flower garden through the summer. It is no uncommon thing to find species in seed, flower and bud in the space of one hundred yards or much less. According to growth, you can pass from winter to spring, then to summer and then to autumn in the descent of a few hundred feet. It is these constant changes that give so much pleasure to the wanderer among the mountains.

A Larkspur (*Delphinium bicolor*) and a Crowfoot (*Ranunculus Eschscholtzii*) are also prominent, the one on the lower slopes, the other in the alpine meadows close to the snow. A large and beautiful water lily is common in the ponds in Beaver creek valley, and numerous flowering shrubs that may be found blossoming from early spring to late summer.

The Pea family is well represented from base to summit, and many species of Astragalus, Hedysarum, Oxytropis and Lathyrus may be detected, both in the woods and on the bare slopes.

The Rose family is in great profusion, and, whether we consider fruit or flowers, they take a first place. Strawberries (*Fragaria*) and raspberries (*Rubus*) are frequently met with, and the fruit is always of fine flavour and very acceptable. Dryas, Potentilla and Spiræa produce lovely flowers and are of many species. The Evening Primrose family is represented by numerous species, the more beautiful of which are the fireweed (*Epilobium angustifolium*) and the low growing species with broad leaves and large purple flowers found on gravel bars (*E. latifolium*). Another species (*E. luteum*) with large yellow flowers is found in the swamps around the summit at Rogers pass. This is both a rare and beautiful species.

Dryas Octopetala, L. (If Flowers are White).
Dryas Drummondii, Hook. (Yellow).

The large family of the Compositæ endows the mountains with a wealth of bloom, and during July and August these forms are in perfection. Asters, Golden Rods, Ragworts, Everlastings, Thistles, Arnicas, Fleabanes are in profusion everywhere. These, with many others of the same order, occupy the ground at all elevations, and, being of all colours, very much diversify the landscape. Everlasting (*Antennaria*), which is our representative of the edelweiss of the Swiss mountains, is found in profusion in many forms on all the open spaces, both at lower and higher altitudes. Of the true Swiss plant we have no representative in America. Following the Compositæ, we have the Ericaceæ or heath family, which is well represented by numerous low-growing shrubs, which on some slopes grow so closely together that they almost smother all other vegetation. The more prominent species are found in such genera as Arctostaphylos, Bryanthus, Cassiope, Gaultheria, Kalmia, Ledum, Menziesia, Pyrola, Rhododendron and Vaccinium, the latter genus alone having no less than nine species that produce edible fruit in abundance. Part of these fruits have been mentioned in another part of this article, and the others are equally valuable, but not so abundant. The False Heaths (*Bryanthus* and *Cassiope*), with the Rhododendron and Kalmia, have lovely flowers and charm the eye with their bright colours and varied forms.

The Figwort family is another group with bright and curious flowers that are found at all altitudes, and chiefly represented by Castilleia, Mimulus, Pedicularis, Pentstemon and Veronica. The Painted Cup (*Castilleia*) is a characteristic genus of the mountains and westward to the Pacific. As its name indicates, it is not the flowers that give it colour, but the bracts that surround it. There are numerous species, but all have the same character and pass from white through yellow and red to dark purple. The Lousewort's (*Pedicularis*) have curiously-shaped flowers and are chiefly found at high altitudes. The genus is both northern and alpine in its distribution. The Monkey flowers (*Mimulus*) are well represented, and two species (*M. luteus* and *Lewisii*), mentioned before, are well worthy of cultivation. There are four other species which are not so conspicuous, but they brighten the borders of many a spring and cheer the traveller as he eats his lunch beside their quiet home.

Orchids are not wanting, but they are not a marked feature of the landscape, yet they charm by their rarity and peculiar forms, when found. Many genera are represented, but some are very rare, and others, like Listera, are not conspicuous. The moccasin flowers or ladies' slippers (*Cypripedium*) are represented by three species, only one of which is at all common. This is the northern ladies' slipper (*C. passerinum*), which may be seen in abundance near the Bow river below the bridge at Banff. The more prominent orchids are in the genus *Habenaria*, and of these there are *H. bracteata*, *dilatata*, *hyperborea*, *obtusata* and *viridis*; none of these are rare.

except the last. The small, round-leaved Orchis (*Orchis rotundifolia*) is quite common in many places, but is most easily obtained along Bow river at Banff. Calypso is the queen of woodland flowers, but is only occasionally seen in the mountains. Towards the Pacific coast it becomes plentiful, and its bulbs are eaten by the Indians and pronounced good.

The Lily family has many representatives, but few of them become obtrusive amongst the other vegetation, and hence do not require even a passing notice. The Erythronium, mentioned in the beginning of this article, is certainly one of the most beautiful of the mountain species when found in groups. A lily (*Lilium Columbianum*) is quite common in the woods at Revelstoke, and the orange lily of the east (*L. Philadelphicum*) comes into the Rocky mountains and may reach the Selkirks. Space does not permit of a more extended notice of the vegetation of the mountains, but over 500 species could be enumerated, found within the Big Bend of the Columbia, or more particularly in the Selkirk mountains.

The Fern family has a large series of forms growing in the mountains, and these alone would well repay a careful study and systematic treatment. The following genera are represented in the Selkirks: Botrychium, Adiantum, Aspidium, Asplenium, Cryptogramma, Cystopteris, Onoclea, Osmunda, Pellaea, Phegopteris, Polypodium, Pteris, Woodsia. Although no special examination has been made, Phegopteris alpestris and Aspidium Oreopteris have been collected on Avalanche mountain by the writer, and are very rare in Canada.

The above remarks on the Natural History of the region in question are only tentative. The chief purpose they were written to serve is to draw attention to the country as a field for either pleasure, sport or scientific investigation. If any of these purposes has been served, my wishes have been accomplished and the work has not been in vain.

Rhododendron [illegible] Hook.

False Solomon's Seal.

SAXIFRAGA BRONCHIALIS, L.

Cassiope Mertensiana, Don.

APPENDIX C.

EXTRACT FROM BULLETIN OF THE GEOLOGICAL SOCIETY OF AMERICA.

Vol. 2, pp. 165-176. February 12th, 1891.

NOTE ON THE GEOLOGICAL STRUCTURE OF THE SELKIRK RANGE

By the Late Dr. George M. Dawson,

Director of the Geological Survey of Canada.

(Read before the Society, December 29th, 1890.)

Provisional Comparative Table of Formations met with in the Selkirk Range.

(Section in the Selkirk Range on line of Canadian Pacific Railway.)

		Feet.
Selkirk Series.	Quartzites with gray schists and some limestone ...	
	Black shaly argillites, limestone and gray schists. ...	
	Gray schists and gray quartzites, with some quartz-conglomerate and interbedded black argillites, the last chiefly towards the base ...	25,000
Nisconlith Series.	Blackish argillite-schists and phyllites, generally calcareous, with some beds of limestone and quartzite ...	15,000
Shuswap Series.	Gray gneissic rocks and coarse mica-schists ...	3,000
		at least.

The section represented in the table is that now obtained for the Selkirks. It occupies, geographically, a position intermediate between that of the eastern border of the interior plateau and that of the Rocky mountains. In this no horizons have yet been fixed palæontologically, and the position given to the rocks, therefore, depends principally on the comparison of the section with that known in the Rocky mountains proper. It is probable, from the composition and condition of the rocks, that they may yet be found to hold fossils; but in the meantime it is believed that the lithological resemblance of the formation to those met with in the Rocky mountains is in itself

sufficient to enable some important general conclusions to be arrived at respecting the rocks of the Selkirk range, while the analogy of the rocks of the Selkirks to those in the eastern border of the interior plateau of British Columbia is also such as to afford some clue to the age of the formations represented in it.

THE SHUSWAP SERIES.—The lowest crystalline, and presumably Archean, rocks largely represented in the western portion of this part of the Selkirk range are evidently referable to the Shuswap series of the eastern border of the interior plateau. They consist chiefly of gray gneisses, varying from nearly massive to quite schistose, and in the latter case frequently having their division-planes thickly covered with glittering mica. They are both hornblendic and micaceous, but the last-named mineral usually preponderates. Orthoclase is apparently the most abundant feldspar, quartz is nearly always well represented and garnets are not infrequent. In many places nearly half the entire mass of the rocks exposed consists of intrusive or vein granite, with pegmatitic or graphitic tendencies.

THE NISCONLITH SERIES.—Overlaying the basal holo-crystalline series in the Selkirk section is a mass of rocks of which the thickness is estimated at 15,000 feet. These are dark-coloured and generally blackish argillite-schists and phyllites, representing various stages in alteration between true argillites and micaceous schists. The rocks are usually rather finely fissile, with glossy and sometimes wrinkled surfaces, but often with much minute yet visible mica on the division-planes. These planes are in some cases evidently due to cleavage, but are often true bedding-planes. The rocks are usually calcareous, and frequently hold thin layers of dark-bluish or black impure limestone, together with occasional layers of dark quartzite. The coloration is evidently due to carbonaceous matter, and pyrites crystals are very common in certain zones. The only notable diversity met with in this otherwise homogeneous mass of rocks is found towards the base, where (at the lower end of Albert canyon) a bed of pure blue-gray crystalline limestone thirty feet or more in thickness, occurs, and a short distance still lower in the section, a series of beds over 1,000 feet in thickness, consisting chiefly of granular pale-gray quartzites. The quartzites are sometimes flaggy and generally more or less micaceous, and are interbedded as well as overlain and underlain by blackish micaceous argillites and layers of coarsely micaceous pale schists.

These rocks undoubtedly represent the Nisconlith series of the eastern border of the interior plateau of British Columbia, of which no extended sections have yet been found in the interior plateau, while to the eastward they certainly correspond in the main with the Bow river series of the Rocky mountains, for which a thickness of 10,000 feet was there ascertained, though the base of the series is never exposed in the Rocky mountains.

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THE SELKIRK SERIES.—Between the foregoing series and the next overlying mass of beds in the Selkirk section no distinct line of division, even of a lithological character, has been observed, there being apparently, on the contrary, a considerable thickness of passage beds, in which the dark schists of the lower series alternate with gray quartzites and gray glossy schists characteristic of the upper series. The estimated thickness of this overlying series is 25,000 feet; and of its rocks the higher central peaks of this part of the range, comprising Mounts Sir Donald, Macdonald, Tupper, Hermit, Cheops, Ross peak and others, appear to be wholly composed. Lithologically, it consists of a great volume of gray schists and gray quartzites, which are occasionally somewhat dolomitic. The quartzites probably preponderate, and vary in colour from nearly white to gray and greenish-gray, being seldom dark in tint. They often, however, weather to pale brownish colours and pass into coarse grits and fine-grained conglomerates; and these grits and conglomerates have become more or less schistose in structure, as a result of pressure, which has also led to the development in them of much fine silvery mica. The schists vary in colour from pale neutral-gray to greenish-gray, and from dull to silvery and lustrous, being in many cases apparently true sericite-schists. They are sometimes wrinkled and contorted, particularly on the east side of the main synclinal, where also they occasionally become coarsely micaceous. To the east of this main synclinal and beyond the great fault shown in the diagrammatic section, they are more crushed and altered and more highly micaceous than elsewhere, probably as a result of the dynamic conditions to which they have been subjected in this region.

The rocks of this great series appear to represent the Adams lake series to the west, while they undoubtedly correspond, at least in a general way, to the Castle mountain group of the Rocky mountain section on the east, for which group Mr. McConnell ascertained a minimum thickness of 7,700 feet, and found reason to believe that its total volume in the western part of the range approached 10,000 feet.

It will be understood, from what has already been said, that the line indicated between this and the underlying series in the Selkirks is based entirely on general lithological differences, while there is every reason to believe that a plane of division drawn to correspond with that between the Castle mountain and Bow river series in the Rocky mountains would lie several thousand feet above the stratigraphical summit of the Nisconlith series in the Selkirks. In the Rocky mountains, the lower Cambrian (Olenellus) fauna is known to be common to the lower part of the Castle mountain and upper part of the Bow river series; the separation being there made at the base of the distinctly calcareous upper part of the Cambrian, while certain rather characteristic quartz-conglomerates observed in the upper part of the

Bow river series of the Rocky mountains are paralleled by similar conglomerates which abound in the upper series of the Selkirks. No unconformity has been observed between the upper and the lower masses of strata in either place.

Though in the Selkirk section the lower of the two great series which have been described resembles the Nisconlith of the interior plateau so closely as to warrant extending the same name to it, the fact that the overlying member of the section differs considerably from the Adams lake series of the interior plateau, while on the other side it probably represents not only the whole Castle mountain group, but also the upper part of the Bow river series of the Rocky mountains, renders necessary the application to it of a provisional distinctive name. It is, therefore, proposed to refer to this rock-mass as the *Selkirk Series*.

STRUCTURE.

Respecting the structural features of the section as a whole, little need be added, as, in so far as these may be considered to have been determined, they are rather simple. The western part of the Selkirk range, for a width of about seventeen miles, is essentially composed of Archean and granitic rocks, which, it may be added, are continued to the west of this part of the Selkirks across the Columbia range for a further distance of about forty miles. These rocks often lie at low, undulating angles, though they are occasionally much contorted. Above these, to the eastward, is the lower member of the Cambrian which has been referred to as the Nisconlith series. This forms a synclinal, of which the western side lies at a low angle, while the eastern side is steep, the axis being found near Illecillewaet station. To the east of the synclinal is a rather sharp anticlinal, the summit of the dark coloured beds of the Nisconlith series passing out of sight on the eastern side of this fold near the 413th mile-post on the railway.

The next great synclinal, which coincides with the highest parts of the range, appears to have a transverse width of about thirteen miles. The rocks contained in it are those of the Selkirk series, which is believed to represent the upper part of the Bow river series, together with the whole of the Castle mountain group of the Rocky mountain section. The position of the main axis of this synclinal nearly corresponds with Loop creek, on the railway, to the west of Glacier station, while a subordinate synclinal trough runs immediately to the east of the same station and nearly coincides with the actual watershed in the pass.

The eastern edge of this synclinal is believed to be bounded by a great fault, which is supposed to cut the line of railway near Cedar creek (about a mile and a half below Surprise creek) and to run on southward along the upper part of Beaver valley. This fault seems to have the character of a number of those found by Mr McConnell

in an adjacent part of the Rocky mountains, viz.: that of a fractured anticlinal, thrust up on the west side in consequence of pressure acting from that direction.

To the east of this great fault, the section shown in figure 1 must yet be considered largely hypothetical, as the structure here becomes more complicated, and there is reason to suspect further extensive faulting. There are, however, grounds for the belief that, in a wide additional synclinal on this flank of the range, together with the repetition of a great part of the Selkirk group, still higher strata, representing the *Grapiolite*-bearing shales and the *Halysites* beds of the Rocky mountains, are included. The section ends on the east at the upper Columbia valley, the line of which is coincident with an important anticlinal exposing rocks of the Castle mountain series, which dip westward into the base of the Selkirks and eastward into the opposite base of the Rocky mountains.

APPENDIX D.

CLIMATE OF THE UPPER MAINLAND OF BRITISH COLUMBIA

By R. F. Stupart,

Director of the Meteorological Service of Canada.

Among the more interesting portions of Canada, as regards its climatic features, is that portion of the Province of British Columbia which lies between the Rocky mountains and the Coast range. Unfortunately, meteorological observations made in this region do not extend over any very extended term of years, but ten years of continuous observation at Kamloops and Banff, and from six to eight years of a more desultory character at Griffin lake, Glacier House and Donald afford data for estimating with a fair degree of accuracy the general climatic conditions of this portion of the Dominion. Geographically, the whole district is so situated that at times continental climatic conditions dominate the weather, and at other times ocean influence extends over the whole region. This amply accounts for the fact that during the winter the range of temperature is decidedly large between the warm and cold spells. Then again, the topographical features of this region are among the most pronounced in the world, and consequently a sharp contrast exists as regards both temperature and precipitation, between places not far distant from each other. What is known in Europe as the Föhn and in America as the Chinook wind is frequent on all the interior plateaus and valleys between the mountain ranges of British Columbia, as well as on the Alberta prairies.

The Chinook is a warm wind and belongs to the wind system of the regular cyclonic areas which at intervals pass into the continent from the Pacific, attended in districts to the southward by westerly winds, the strength of which is proportional to the energy of the cyclonic disturbance. We know that the pressure of the atmosphere decreases upwards; when, therefore, a mass of air is forced by any cause to raise itself from the surface of the earth to a certain height it will be subjected to a constantly diminishing pressure and will accordingly expand, but as every expansion is a work which is accompanied by a consumption of heat, the air is cooled as it rises, as long as the cooling is not greater than will allow the air to retain its

watery vapour, the heat will, according to calculations which have been confirmed by observations, diminish almost exactly 1° Fah. for every 180 feet the air rises. On the other hand, if the dew point is exceeded, so that the watery vapour forms clouds, rain or snow, the moisture will pass from the form of vapour to the fluid or solid state, whereby the contained heat is set free. The cooling from this moment proceeds more slowly, and it may, within the limits of which we have experience, be stated as about ½° Fah. for every 180 feet.

When a mass of air, on the contrary, sinks towards the surface of the earth, it comes under higher pressure, is compressed and consequently heated. Its temperature will rise more and more above the dew point and the moisture will with continually increasing ease be held dissolved in the state of vapour. The heating during the whole descent will be 1° Fah. for every 180 feet.

These physical laws, first applied by Dr. Hann, of Vienna, explain the properties of the Chinook. The air comes from the Pacific saturated with moisture, is forced up the western slopes of British Columbia, where the moisture is precipitated in the form of rain at low levels and snow at higher levels, and then, rushing through the passes and over the summits of the mountains, descends into the eastern valleys at a considerably higher temperature than it had at a corresponding altitude on the western slopes.

The Pacific winds are deprived of their moisture as they ascend the western slopes of the Coast range, and a wet climate results along the coast and in the Fraser valley, but the air, after passing over the Coast range, either flows eastward or is drawn down to lower levels, becoming drier and warmer, and the interior plateau between the Selkirk and Coast ranges possesses a comparatively dry climate. Again impinging on the western slopes, first of the Gold range and then of the Selkirks, the air is again forced upwards, with a lowering of temperature, and a large snow-fall results in winter and a good deal of rain falls in the warmer seasons. After passing the summit of the Selkirks, the air, being no longer forced upward to the higher levels, ceases to deposit moisture until it again impinges against the still more lofty Rockies.

The lower Fraser valley and the Coast neighbourhood of British Columbia possess a much more equable climate than other parts of the province; the annual mean temperature is between 48° and 52°. The winters are not cold, the January temperatures being nearly the same as London, England. Spring opens as early as in the south of England, and summers are long and pleasant, with much sunshine weather.

Passing to the eastward of the Coast range, we find a different climate; the summers are warmer and the winters are colder than on the coast. As regards temperature, December and January may be fairly compared with the corresponding months in the Niagara district, and indeed the whole summer may well be compared with

Southern Ontario, except that the air is much drier and the precipitation is very scant; in addition to this, the spring is earlier.

Griffin lake is situated about 100 miles to the eastward of Kamloops, among the foothills of the Selkirks, and the effect of this greater distance from the high Coast range and increasing altitude is shown in a somewhat lower temperature than at Kamloops and a larger amount of precipitation. The snow-fall here aggregates about 130 inches each winter.

As the Selkirks are ascended, the effect of increasing altitude becomes manifest, and at Glacier House, at the base of Mount Sir Donald, the mean monthly temperature averages nearly 8° lower than at Griffin lake, and the precipitation becomes much greater, owing chiefly to an exceptionally heavy snow-fall between October and April; the fall aggregating as much as 27 feet. July and August are months with a mean temperature rarely exceeding 57° or 58°, and with pleasantly warm days and usually bright sunshine, followed by cool nights, the marvellous scenery of the Selkirks and the great Illecillewaet glacier can be thoroughly enjoyed.

East of Rogers pass, in the valley of the northward-flowing Columbia, again is found the Chinook effect as evidenced by drier weather and a greater preponderance of clear skies than on the western slopes. The level, however, is still high, the lofty Rockies are not far to the eastward and the distance from the coast is now so great that, except when the Chinook is blowing, the character of the winter betakes rather of the continental than the coast type.

Reference to the accompanying table will show that at Donald nearly all months are characterized by a large daily range of temperature, and that occasionally in winter extremely low temperatures are recorded.

TABLE

SHOWING the average mean highest, mean lowest, and mean temperatures: the mean daily range, and the highest and lowest temperatures recorded: also the average rain and snowfall and mean precipitation, at

DONALD, B. C.

Latitude 51° 29' 13". Longitude 117° 10' 38". Height above sea, 2,580 ft.

Month.	Temperature.						Precipitation.		
	Mean of Ten Years' Observations.				Highest and Lowest Recorded in Ten Years.		Mean of Ten Years' Observations.		
	Mean Highest.	Mean Lowest.	Normal.	Range.	Highest.	Lowest.	Rain.	Snow.	Precipitation.
	°	°	°	°	°	°	in.	in.	in.
January	19·5	1·9	10·7	17·6	42	45	0·23	32	3·43
February	27·8	6·6	17·2	21·2	47	39	0·52	19	2·42
March	41·3	15·9	28·6	25·4	67	25	0·91	8	1·71
April	52·1	27·2	39·6	24·9	74	20	0·63	5	1·13
May	63·1	34·4	48·8	28·7	87	19	1·27	1·5	1·42
June	70·1	39·8	55·0	30·3	97	29	1·39	0	1·39
July	78·0	44·1	61·0	33·9	94	32	0·81	0	0·81
August	77·6	42·7	60·2	34·9	87	32	1·62	0	1·62
September	64·0	35·3	49·6	28·7	86	26	2·79	0	2·79
October	50·3	28·9	39·6	21·4	74	14	0·63	2	0·83
November	31·8	19·0	25·4	12·8	50	21	1·14	25	3·64
December	20·5	5·6	13·0	14·9	41	38	0·40	38	4·20
	596·1	301·4	448·7						
Year	49·7	25·1	37·4		97	45	12·54	130·5	26·39
								39·06	

TABLE

SHOWING the average mean highest, mean lowest, and mean temperature; the mean daily range, and the highest and lowest temperatures recorded; also the average rain and snowfall and mean precipitation, at

GLACIER HOUSE, B.C.

Latitude 51° 15′ 0″. Longitude 117° 29′ 30″. Height above sea, 4,093 ft.

Month.	Temperature.						Precipitation.		
	Mean of Five Years' Observations.				Highest and Lowest Recorded in Five Years.		Mean of Five Years' Observations.		
	Mean Highest.	Mean Lowest.	Normal.	Range.	Highest.	Lowest.	Rain.	Snow.	Precipitation.
							in.	in.	in.
January	22·6	12·8	17·7	9·8	39	18	0·52	8·5	1·37
February	29·9	18·9	24·4	11·0	43	21	0·60	8·0	1·40
March	33·6	16·4	25·0	17·2	56	13	0·33	4·0	0·73
April	45·4	28·2	36·8	17·2	58	3	0·18	1·9	0·37
May	56·7	36·9	46·8	19·8	70	20	1·65	0	1·65
June	62·1	37·5	49·8	24·6	80	30	2·96	0	2·96
July	71·2	44·4	57·8	26·8	86	34	1·33	0	1·33
August	69·8	43·7	56·7	26·1	80	38	0·83	0	0·83
September	55·8	37·4	46·6	18·4	74	27	4·32	2	4·52
October	47·3	31·3	39·3	16·0	75	21	1·38	10	2·38
November	32·0	18·3	25·1	13·7	48	7	0·25	9·6	1·21
December	25·4	11·5	17·4	9·9	45	21	0·60	7·6	1·36
	549·8	332·3	443·4						
Year	45·8	28·1	36·9		86	7	12·98	43·7	26·68
							38·71 9·10		

TABLE

SHOWING the average mean highest, mean lowest, and mean temperature; the mean daily range, and the highest and lowest temperatures recorded; also the average rain and snowfall, and mean precipitation, at

KAMLOOPS, B.C.

Latitude 50° 40′ 39″. Longitude 120° 19′ 42″. Height above sea, 1,149 ft.

MONTH.	TEMPERATURE.						PRECIPITATION.		
	Mean of Ten Years' Observations.				Highest and Lowest Recorded in Ten Years.		Mean of Ten Years' Observations.		
	Mean Highest.	Mean Lowest.	Normal.	Range.	Highest.	Lowest.	Rain.	Snow.	Precipitation.
	°	°	°	°	°	°	in.	in.	in.
January	30·7	17·7	24·2	13·0	56	−27	0·13	6·9	0·82
February	33·7	18·4	26·0	15·3	64	−27	0·28	5·1	0·79
March	46·9	27·5	37·2	19·4	69	5	0·33	1·1	0·44
April	60·5	37·6	49·0	22·9	79	27	0·31		0·31
May	70·2	45·9	58·0	24·3	100	26	1·09		1·09
June	75·6	51·2	63·4	24·4	101	39	1·48		1·48
July	81·8	54·8	68·3	27·0	101	44	1·53		1·53
August	82·1	54·9	68·5	27·2	101	39	0·91		0·91
September	69·5	46·1	57·8	23·4	87	31	0·89		0·89
October	56·8	39·1	48·0	17·7	82	16	0·52	0·4	0·56
November	40·0	28·3	34·2	11·7	65	−22	0·44	7·2	1·16
December	35·3	24·9	30·1	10·4	56	−17	0·29	4·5	0·74
	683·1	446·4	564·7						
Year	56·9	37·2	47·1		101	−27	8·07	31·9	10·08
								7·23	

TABLE

Showing the average mean highest, mean lowest, and mean temperature; the mean daily range, and the highest and lowest temperatures recorded: also the average rain and snowfall, and mean precipitation, at

GRIFFIN LAKE, B.C.

Latitude 50° 57′ 59″. Longitude 118° 30′ 51″. Height above sea, 1,511 ft.

Month.	Temperature.						Precipitation.		
	Mean of Ten Years' Observations.				Highest and Lowest Recorded in Ten Years.		Mean of Ten Years' Observations.		
	Mean Highest.	Mean Lowest.	Normal.	Range.	Highest.	Lowest.	Rain.	Snow.	Precipitation.
	°	°	°	°	°	°	in.	in.	in.
January...	32·1	17·4	24·7	14·7	50	−22	0·76	30	3·76
February..	33·0	19·8	26·4	13·2	60	−23	0·76	34	4·16
March	43·8	25·9	34·8	17·9	62	−12	0·91	13	2·21
April	58·6	34·9	46·7	23·7	95	23	1·87	1	1·97
May	68·4	41·2	54·8	27·2	100	19	2·48	0	2·48
June	75·0	46·2	60·6	28·8	108	20	2·58	0	2·58
July	82·3	49·3	65·8	33·0	110	36	2·31	0	2·31
August....	81·2	49·7	65·4	31·5	110	38	2·62	0	2·62
September	66·3	41·4	53·8	24·9	87	12	1·77	0	1·77
October..	50·9	32·5	41·7	18·4	68	11	2·54	0·5	2·59
November.	38·3	23·9	31·1	14·4	55	−13	1·43	22	3·63
December.	36·2	22·9	29·5	13·3	53	−12	1·49	28	4·29
	666·1	405·1	535·3						
Year	55·5	33·8	44·6		110	−23	21·52	128·5	34·37
								10·7 ft.	

APPENDIX E.

MAJOR A. B. ROGERS' FIRST EXPEDITION UP THE ILLECILLEWAET VALLEY, IN 1881, ACCOMPANIED BY HIS NEPHEW, A. L. ROGERS.

An Account of the Trip by A. L. Rogers.

Major A. B. Rogers was born at Orleans, Barnstable county, Massachusetts, in 1829. He received a common school education and at an early age began his apprenticeship as a ship carpenter, and made one trip at sea in that capacity. In 1847, he entered the engineering department of Brown's University. Subsequently he went to Yale as assistant to Professor Norton, having charge of the field class, and there graduated, receiving the degree of B.A.

He was connected with the engineering department of the Erie canal, after which, in 1858, he went to Waterville, Minnesota, where he engaged in business with his brother. During the Sioux outbreak in 1862, he was commissioned Major by Governor Ramsey, of Minnesota.

In 1861 to 1865 he had charge of the construction of the Iowa and Minnesota division of the Chicago, Milwaukee and St. Paul railway. He also had charge of the building of the Minneapolis and St. Louis road, and built the Hastings and Dakota railway across Minnesota for Selah Chamberlain.

His reputation as a locating engineer and his advanced ideas in railroad construction attracted the attention of Mr. James Hill, one of the principal members of the Canadian Pacific railway syndicate.

In 1881, Mr. Hill engaged him to take charge of the Mountain division of the Canadian Pacific railway from Savona's ferry, in British Columbia, to Moose Jaw, North-West Territories, with instructions to find the shortest practicable routes between those points.

Obtaining from Mr. Walter Moberly such information with regard to this section as his personal experience had given him, and from the Hudson's Bay company letters to their western posts, and last, but by no means least, a most generous letter to the Jesuit missions, and a photograph of His Grace from Archbishop Taché, he left St. Paul with his nephew, April 1st, for Victoria by way of San Francisco, then the quickest route. Before leaving St. Paul, he made arrange-

mouts with the company to forward up the Missouri river, by boat to Fort Benton, thence by wagon to Bow River Gap, on the east side of the Rockies, five complete engineering outfits, one hundred and twenty-five men, with their equipments, and a year's supplies.

The spirit of the man is shown by the boldness of his plans, his purpose being to make his way from the Pacific coast across an unknown mountain region and meet his assistants by July 1st. By his indomitable push he accomplished this purpose, but fifteen days later than the time set, having covered all but about one hundred miles of the route as finally accepted, and having made a long detour into the United States for supplies.

Twenty-two days were consumed in our trip from St. Paul to Kamloops, B.C., the principal outfitting point of that country. The desire for information regarding the country into which we were to venture was ever uppermost in our minds, and the art of asking questions was used to the limit. Eight days more of our time was exhausted in estimating distances; trying to find out how far an Indian can travel between suns with one hundred pounds on his back and no trail, how little food he would require to do it and what kind of food was best under such conditions; what protection we should need from the weather and the possibilities of supplementing our larder, by killing game. After a good deal of trouble which resulted in subsidising the Indian Chief Louie, and with the kind assistance of the priest in charge of the mission, we enlisted ten strapping young Indians on rather an ironclad contract:—their services would be ours without grumbling until discharged, and if any came back without a letter of good report, his wages were to go to the church, and the chief was to lay one hundred lashes on the bare back of the offender.

From my diary of April 29th, 1881, I take the list of supplies bought at the Hudson's Bay post in Kamloops: 2 rifles, 200 rounds ammunition, 8 pairs blankets, 2 axes, 50 feet ¾ inch rope, 12 tin plates, 1 tin bucket, 12 tin cups, 2 fry-pans, 12 tump-lines or pack-straps and 6 dog tents, each of these tents being made of two strips of drilling nine feet long sewed together lengthwise and with a stout cord fastened to each corner; 800 lbs. of flour, 337 lbs. bacon, 25 lbs. baking powder, 25 lbs. salt, 10 lbs. tea, 1 tin of matches.

On the 30th of April, we chartered a small steamer to take us to the mouth of Eagle river on Shuswap lake. On Sunday, 1st May, landing at the mouth of the Eagle, we bade farewell to the last sign of civilization.

Finding an old canoe at the mouth of the river, we used it in transporting our outfit as far as possible. After caching the canoe and taking our packs on our backs, we discovered that though our commissary seemed meagre, it was not possible to carry it all at one trip. The necessary cachings and returns made our trip across the Gold range to the Columbia one of fourteen days of hard travel. On

reaching the Columbia, we built a raft of cedar logs large enough to carry our supplies, Major Rogers and myself, the Indians swimming, with one hand pushing the raft to make the crossing, and landed a mile above the mouth of the Illecillewaet. Our provisions had now been so lightened that caching and return trips were unnecessary. Having learned by this time what a day's march through the average country was, as well as the capacity of the Indian appetite when unchecked, we were obliged to make a strict ration. This caused much discontent among the Indians, as the work was extremely hard, but, finding that no distinction was made between them and ourselves, they soon became reconciled.

From now on we pushed them, making twenty minute runs, with five minute rests, through the day. The travelling was exceedingly difficult and, picking our way over mudfalls, scaling perpendicular rock-points, wading through beaver swamps dense with undergrowth and the villainous devil's clubs, all the time balancing one hundred pounds on the back of the neck, made life anything but a pleasant dream, and I am convinced, but for the fear of the penalty of returning without their letters of good report, our Indians would have deserted us.

Although at this season the days were very long and we travelled from early till late, we were five days making sixteen miles and arrived at the forks of the Illecillewaet, which was the farthest point white men had ever reached. Our course was up the east fork and one mile and a half from its mouth we came to a most wonderful box canyon or gorge, which three years later was named by Rev. George M. Grant—Albert Canyon—in honour of the writer.

There must have been heavy snows in the mountains the preceding winter, for snow on the level was several feet in depth in sheltered spots, and the next five days our course was across avalanches, some of which had started from the very peaks and had left a clean path behind them, crushing the timber into match wood for several hundred feet on the opposite sides of the mountains. We crossed several snow-bridges under which the river passed, which were one hundred and fifty feet above the river's bed.

On May 27th, we found the snow in the valley about five feet on the level and, it being too soft to hold us, we waded the river most of the day.

At different times, we killed caribou, mountain goat and bear and restocked our larder.

On the 28th May, we came to where the streams seemed to fork and in front of us appeared the back bone or main range of the Selkirks. The whole success of our trip and the possibilities of getting a direct route for this great national thoroughfare depended upon the gateways that might be at the head of either of these streams.

At this altitude it was cold enough to freeze during the night and when the snow became hard enough to bear our weight, we broke camp in the night, keeping as much as possible in the shade of the mountains after sunrise. By nine o'clock in the morning we had to camp, the snow being too soft to carry us. At the forks we decided to cache everything that would impede travel, and make a hurried trip up the north fork to the summit. The stream had now grown so small we could easily jump it. We took all the Indians with us, not daring to leave them with the supplies, which were getting alarmingly low, and short rations had already begun to tell on us by the number of holes we had taken up on our belts. The terrible travelling with our heavy loads, soaked to the skin by rain and wet brush, wading in snow and ice-water, and sleeping in but one-half pair of blankets to each man had begun to show on all our faces. With two days' rations we started as soon as the crust would hold us and, with easier travelling, we made fine time. Keeping in the lee of the great mountain which we called Syndicate peak, we were in its shadow all day and were able to travel until four o'clock p.m., when we came to a large level opening which appeared to be the summit. We camped on the edge of the timber out of the possible path of the snow-slides, for we were beginning to have a wholesome respect for this great force of nature, whose rumbling thunder we had heard for the past few days. The moment the sun's rays disappeared behind the mountains the crust began to form and in a short time we were able to make a hurried trip across the summit and convinced ourselves that the water divided here, running east and west.

After checking up our barometric readings and mapping the course of the valleys, we decided to climb the mountains on the south side of the pass to get a better geographical idea of the country, as the timber in the valleys was very dense and obstructed all view.

From the opening of the summit we had seen a strip of timber extending about half-way up the mountain between two snow-slides, and decided to make our ascent at that point. Cutting each a good, tough, dry, fir stick and adjusting our light packs, we began to climb. Being spare as greyhounds, with lungs and muscles of the best, we soon reached the timber-line, where the climbing became very difficult. We crawled along the ledges, getting a toe-hole here and a finger-hole there, keeping in the shade as much as possible and kicking toe-holes in the snow crust. When several hundred feet above the timber-line, we followed a narrow ledge around a point that was exposed to the sun. Four of the Indians in the lead had tied their pack-straps to each other's belts in order to help over bad places. The leader had made several attempts to gain the ledge above by crawling on the soft snow, when by some awkward move he fell backward with such force as to miss the ledge upon which the other three stood, pulling them headlong after him. They fell some thirty feet straight down, striking upon a very steep incline. The snow being soft and their

momentum so great, it was impossible to check their speed and they went rolling and tumbling, tangled up in their pack-straps, until they disappeared from view over another ledge. Our hearts were in our mouths, fearing the worst might have happened to them. Dead Indians were easily buried, but men with broken legs, to be carried out through such a country and with barely food enough to take us back to the Columbia river on a forced march, made a problem which even strong men dreaded to face. Any one who has been a mountain climber knows that there are times when going down is a great deal more dangerous and difficult than going up. Slowly descending, we had nearly reached the timber-line when one of the Indians with an exclamation pointed to four black specks moving across a snow-slide far below. Our glasses were quickly turned on them. There they were and, to our great relief, all were on their pins making down the mountain as fast as possible. We had lost several hours of the best part of the day for climbing, but we had started for the top and what Major Rogers purposed that he performed. It was late in the evening when we reached the summit, very much exhausted.

Such a view! Never to be forgotten! Our eyesight caromed from one bold peak to another for miles in all directions. The wind blew fiercely across the ridge and scuddy clouds were whirled in the eddies behind the great towering peaks of bare rocks. Everything was covered with a shroud of white, giving the whole landscape the appearance of snow-clad desolation. Far beneath us was the timber-line and in the valleys below, the dense timber seemed but a narrow shadow which marked their course. We had no wood for fire, no boughs for beds, were wet with perspiration and eating snow to quench our thirst—not a pleasant prospect for camp; but the grandeur of the view, sublime beyond conception, crowded out all thoughts of our discomforts.

Standing upon a narrow ridge at that great elevation, mid nature crowned by solitude, where a single false move would land one in the great beyond, man feels his weakness and realizes how small is human effort when compared with the evidence of nature's forces.

Crawling along this ridge, we came to a small ledge protected from the wind by a great perpendicular rock. Here, we decided to wait until the crust again formed on the snow and the morning light enabled us to travel. At ten o'clock it was still twilight on the peaks, but the valleys below were filled with the deepest gloom. We wrapped ourselves in our blankets and nibbled at our dry meat and hominy, stamping our feet in the snow to keep them from freezing, and taking turns at whipping each other with our pack straps to keep up circulation.

Only four hours we waited, but it seemed as if those four hours outran all time. At two o'clock dawn began to glimmer in the east and as soon as we were able to distinguish objects, we were only too glad to crawl back to the ridge. Coming to the foot of the great

triangular peak we had named Syndicate, we traced the valley to the upper south fork of the Illecillewaet and found that it extended but a short distance in a southerly direction and paralleled the valley on the opposite side of the dividing range, through which, we concluded, ran the waters of the Beaver, which emptied into the Columbia on the east side of the Selkirks. But old Syndicate was in front of us and further progress south on the ridge was ended, for it would be a bolder climber than we who would attempt to scale this point. From here we started straight down the incline, the snow having crusted and settled sufficiently to bear our weight. So steep was the descent that we were forced to go down backwards, kicking toe-holes in the snow as we descended. After travelling in this manner for several hundred feet, one of the Indians missed his footing and fell, sliding five or six hundred feet and landing in a basin just above snow-line. The rest of us, seeing that he reached bottom in safety, promptly sat down and followed. Swinging to the left, we travelled for a mile or more through the timber-line and came upon another great field of snow with a moderate incline to the bottom of the valley. Little did we dream that before us lay the great glacier,* nor did we discover its nature till 'Little Alec', who had ventured ahead, suddenly dropped out of sight. Hurrying to the spot, we found him some thirty feet below the surface, betwen two walls of blue ice. Splicing our pack-straps, we lowered the line, which with difficulty he fastened to his belt, and we hauled him out. From here we proceeded with more caution, not knowing what pit-falls lay under the light snow. Reaching our cache without further trouble, we found our other four Indians smoking the meat of a caribou which they had killed the day before on their way down the mountain. With much regret we were forced to give up going farther, as we had but a scant eight days' rations left, and decided to retrace our steps to the Columbia, which we reached after seven days of hard travel, having lived entirely upon dried meat, saving our flour.

The Columbia had risen some thirty feet since our crossing it twenty odd days before. Having made a raft of two cedar logs and sweeps also of cedar, we sent eight of the Indians home by the Eagle pass and taking the other two, we started down the river, hoping to meet some of the Columbia River Indians, of whom we might get canoes and a guide and so make our way to Fort Colville, Washington Territory.

Pulling the raft through the Upper Arrow lake, using our dog traits for sails, we finally found Indians from whom we obtained canoes and food. Hiring one as a guide, we proceeded down the lake and river and passed the boundary at Old Fort Shepherd, Saturday,

* It is thought that Mr. Rogers here refers to another and smaller glacier, under the impression it was that now known as the Illecillewaet glacier. It will be remembered the face of the country was shrouded in snow, and was [illegible] for the first time. A. O. W.

11th June, at about 10 o'clock. We made portage at the Dalles and kept on to Marcus, where we hired a team and drove to Fort Colville. Here we discharged the last of our Indians, they to make their way back over the old Kettle river trail.

Going from Fort Colville to Spokane, we bought saddle horses, pack-train and supplies, hired two men and made our way through the Pend d'Oreille pass in northern Idaho, crossed the Kootenay river at Bonners ferry and followed the old government trail up the Moyie river to Wild Horse mining camp. Here, Major Rogers hired two Indian guides and went alone up the Kootenay and down the Columbia.

Crossing the Bristow range by the Kananaskis pass, he went down the Bow river, arriving at the Gap, where his engineers were camped, on the 15th of July. The writer followed with the pack-train to the head-waters of the Columbia, where he hired Indians and canoes and went down the river to the mouth of the Kicking-Horse. Leaving one Indian in charge of the supplies, with the other he followed the Kicking-Horse to its source, where he met one of the engineering crews, which was at work at the summit of the Rockies.

The rest of the summer was spent in exploring the different passes in the Rockies at the head of the Bow river and its tributaries. The next spring, having our base of supplies at the mouth of the Kicking-Horse, Major Rogers with myself and six white men made the summit of the Selkirks by way of the Beaver on the east slope.

Major Rogers continued with the Canadian Pacific until the driving of the last spike, when he was again employed by Mr. Hill to prospect the route from Sun river, Montana, to Puget Sound, over which now runs the Great Northern railway.

In the summer of 1887, in the Coeur d'Alene mountains in Idaho, his horse stumbling on a steep trail, he fell, striking heavily upon a stump. From the effects of this fall he died in May, 1889.

APPENDIX F.

A SHORT DESCRIPTION OF THE CANADIAN PACIFIC RAILWAY THROUGH THE SELKIRKS

By H. B. Muckleston,

Late Assistant Engineer, Pacific Division.

The traveller going west over the main line of the Canadian Pacific railway, even after passing through the Rockies, cannot but be impressed by his first glimpse of the Selkirk range. As the train emerges from the canyon of the Kicking-Horse to the broad level of the Columbia valley, he sees, for the first time, this majestic line of snow-covered peaks directly in front. To the eye, there is no opening by which the road can advance to the ocean, save by the river. As far as one can see in either direction, this long array of mountains seems to go on without a break. The railway has to follow the Columbia for nearly thirty miles to the north before a feasible pass is encountered, and when found, it must seem almost insurmountable in respect to the enormous difficulties it presents to the railway builder. From Donald, where the passage of the Selkirks really begins, to Revelstoke on the other side of the range, one problem after another presented itself and had to be solved.

To tell now all of these obstacles, since overcome, would require ten times the space which this short article permits of.

The first difficulty encountered was the crossing of the Columbia. This occurs about a mile west of Donald. The river here is about three hundred feet wide and did not present a very serious problem. The bridge consists of two lattice trusses of 128 feet each and two deck spans of 60 feet. The foundations presented little difficulty and were easily made secure by piling, with concrete capping, on which the piers rest. As the original wooden bridge had been in position for some years, the river had, in course of time, accumulated itself to the obstruction of the central pier, and when the new bridge was built, the crib-work pier of the old one was used as a caisson for the building of the stone pier of the new. The shore piers are founded on piles, as are also the abutments, at least the east one.

After crossing the river the course of the line is down the west bank of the stream, which shortly after leaving Donald contracts into a narrow box canyon. The track is about a hundred feet above the water, and is thus carried past the canyon, avoiding some very

heavy rock-work, which would have been necessary at a lower grade. The line rises somewhat after leaving Donald and reaches a summit about three miles out, when it begins to descend again till it reaches the river, six miles further on, at the bottom of a narrow defile. It follows the general course of the stream as far as Beavermouth, never very far away from it, and never much above the water. Two short tunnels were necessary in the twelve miles between Donald and Beaver, and some extremely heavy curvatures; one curve, a ten-degree, being more than ninety degrees in length, followed by an eight-degree curve for a corresponding distance in the opposite direction, the tangent between them being little more than seventy feet. The bridges on this twelve-mile section are not of any great size or in any way remarkable. Many of them have been filled over a culvert, while others, as their turn comes, are to be disposed of in the same way. One of these, over Old Man creek, is to be relieved by a ten-foot stream tunnel, and the bridge filled. As this proposed tunnel is in a soluble slate, it will be necessary to line it with concrete, and, as the stream brings down a great deal of gravel, a floor of vitrified brick is proposed. It is estimated that this tunnel can be built and the bridge filled at the cost of a ten-foot culvert alone.

The railway leaves the Columbia river a short distance beyond Beavermouth and commences the ascent of the pass. The entrance to the pass is by way of the Beaver canyon, a narrow gorge through which the Beaver river tumbles to the Columbia. The formation in this canyon is peculiar, the strata being at right angles to the course of the stream and absolutely vertical. Most of the rock is of a quartzose nature, and in places some unusually hard layer is seen standing out like a board fence. One of these 'fences' is only four inches thick and is certainly twenty feet high. As a result of such a formation, the work was rendered very difficult, owing to the irregular nature of the sides of the canyon. In one case the track had to be carried over an elbow of the stream by a short Howe span. Since opening the line, this span has been replaced by a retaining wall built on the river bottom.

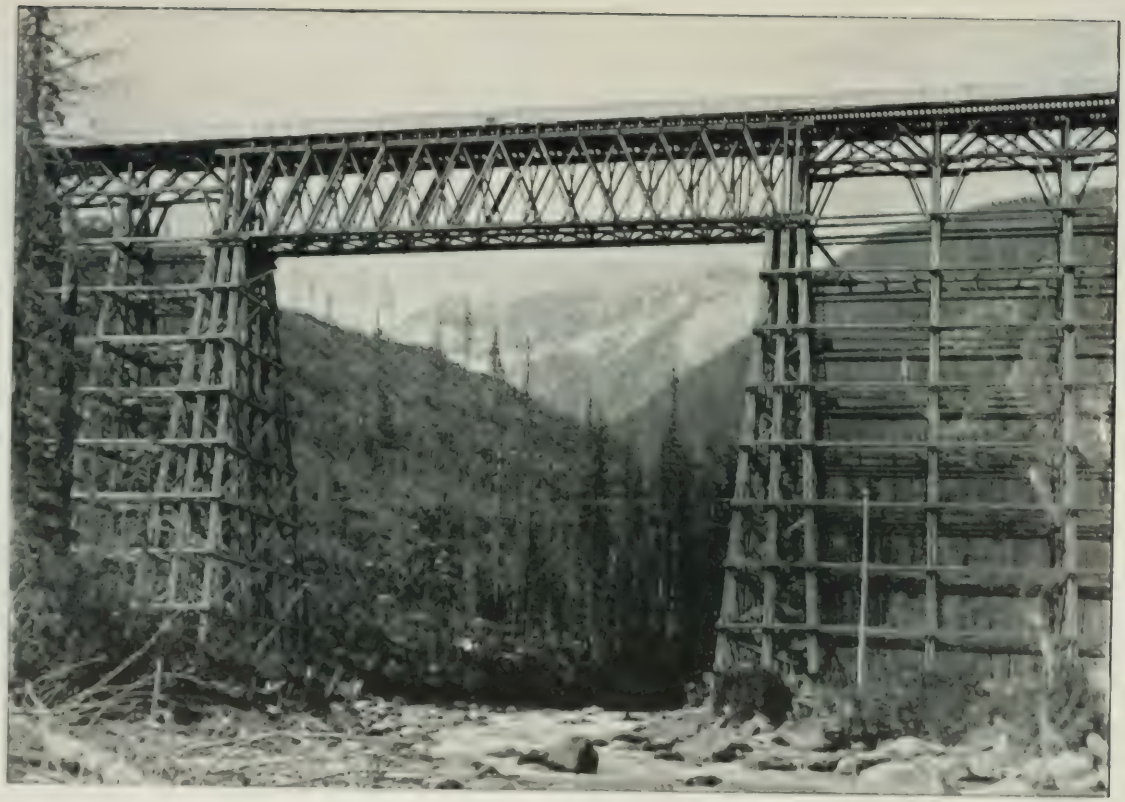
The Beaver river is crossed at the upper end of the canyon by a Howe truss bridge on crib piers, with trestle approaches. The bridge is this year to be replaced in steel on masonry abutments, and the approaches filled.

The first part of the climb from Beavermouth up the Beaver canyon is by a grade of one and a half per hundred, or about seventy-five feet to a mile. A short stretch of comparative level ensues, until Six-mile creek is crossed, when the ascent of the pass commences in earnest. The bridge over Six-mile creek is a plate girder of sixty feet, resting for the present on pile piers.

Shortly after crossing this bridge, the best view of the mountains is obtained. The valley of the Beaver can be traced for miles into the range, bounded on each side by giant peaks. The grade from Six

mile creek, until we reach the summit, twenty miles farther on, is almost continuous at the rate of two and two-tenths per cent. The line can be seen far in advance as a long side-hill cut gradually climbing the valley. Numerous ravines are crossed on trestle bridges; however, these bridges are becoming less frequent every year. Many have been filled, leaving a culvert to take care of the stream, while others have been replaced by permanent structures of stone or steel. There are many fine stone arches through the Selkirks, which, in a great many cases, seem altogether too large for the amount of water flowing through them. But the character of a mountain stream cannot be judged by a casual acquaintance. These streams have been under close observation for a good many years and it has been found, by dear experience, that no mountain rivulet can be trusted to remain one for long. A gulch may be perfectly dry one day and carry a raging torrent the next. Also, there are slides of snow or mud to provide for. One of these stone arches replaces a bridge, which was carried out six times by snow-slides. At another point, an innocent-looking stream, which would hardly fill a ten-inch pipe, is liable at irregular intervals to bring down a torrent of semi-liquid mud, which would sweep out anything in its path not a part of the mother rock itself. The stream takes its rise in a small lake up the mountain side which seems to fill up with mud from a source not yet known, building a sort of dam across the creek. When the water succeeds in destroying this dam, the whole accumulation sweeps down the gulch, carrying with it anything movable which may be in the road.

A great many of the streams have been put through pipe culverts. In this locality they are built of vitrified sewer-pipe, usually twenty-four inch, cemented at the joints and prevented from moving by heavy collars of masonry, about fifteen feet apart on the pipe. When the bottom of the gulch was of a nature to be depended upon, the pipe was laid in a trench excavated in the bed of the stream. In some cases, however, it was necessary to provide better foundation, and then the bed was filled to a greater or lesser depth with rock, and the pipe laid on this fill. So far, these pipes have done their work well, and provided the fill be not too deep, they form one of the cheapest as well as one of the most satisfactory culverts on the road, especially if the slope is steep. The filling in the majority of cases is done by shovel and train, and costs anywhere from twelve to twenty cents a yard, depending on the character of the digging and the distance it is hauled. On heavy grades the distance is a considerable factor in the expense. The filling at Mountain creek was performed by the hydraulic method. The fortunate combination of a large deposit of gravel, with a good head of water available, made the method the cheapest, as well as the best, that could be adopted. In this class of filling, the water is brought down in a box flume and steel pipe to the site of the pit. By directing a strong jet of water at the face of the gravel bank, the material is undercut and allowed to fall into the



Old wooden bridge over McGuan Creek.

sluice-boxes, precisely as in washing gold by the hydraulic jet. After leaving the sluice-boxes, the material is compelled to stay in the appointed place by rows of old ties, logs or large stones, forming a small dam, over which the escaping water must flow after depositing its load of earth. Large boulders were easily handled by the force of the jet, and a few men, to keep the sluices clear, were really all that were needed in addition to the men at the monitor. The total quantity of filling done in this way is 230,000 yards, costing somewhere about seven cents a yard to handle. As the season is short in which the work can be done and as, moreover, much of the plant has to be removed on the approach of winter, the cost is higher than would otherwise be the case. As compared with the steam-shovel work, this method has the great advantage of cheapness, and, where large fills have to be made, is the best plan that can be adopted, provided, of course, that conditions are favourable. Owing to the initial cost of installation, it is not admissible except for very large undertakings.

Mountain creek bridge, when built, was one of the largest wooden structures in the world, taking into consideration the amount of timber used. The original structure consisted of a trestle of maximum height, 190 feet, with a Howe truss over the creek. The trestle-bents were spaced at thirty feet, connected at the top by short spans with continuous chords.

This bridge is being replaced by a steel trestle or viaduct to consist of 100-foot lattice trusses on steel towers, with 40-foot plate-girders over the tops of the towers. Owing to the solid character of the hydraulic fill, the masonry pedestals can be built directly on the dump without resorting to piles or artificial foundation of any kind.

West of Mountain creek are several very high bridges of steel on stone piers, that over Cedar creek being the first; then, in rapid succession, Raspberry, Surprise, Snow-bank and Stony creeks. One Howe truss remains and will be eliminated this year by filling the gorge. Surprise creek is a magnificent steel arch over a deep gorge. The original structure here was made up of three Howe trusses on high wooden towers. The present arch is a three hundred foot span and carries the rails two hundred and fifty feet above the stream. The most remarkable bridge on the section is, however, that over Stony creek. This magnificent structure is a steel arch truss, having a span of three hundred and thirty six feet and a rise from its abutments of one hundred and twenty. The clear height of the structure is two hundred and ninety-six feet from the stream to the base of rail. It was built in 1893 and replaced the highest wooden structure of its kind in the world. This was a continuous Howe truss of four spans: thirty-three, one hundred and sixty-one, one hundred and seventy-two and eighty-six feet respectively, supported by wooden towers two hundred feet high, on concrete footings.

After crossing Stony creek, the region of destructive snow-slides is reached. Owing to the geographic situation of the Selkirks, exposed

with their comparatively great height, these mountains intercept most of the moisture contained by the air currents passing over them. In consequence, there is an extremely large precipitation and correspondingly luxuriant vegetation. As much of the precipitation is in the form of snow, it follows that the annual snow-fall is phenomenal. The average yearly snow-fall at the Glacier House is some thirty-five feet, which for the winter of 1898-99 reached the enormous total of forty-four, the fall, for the month of January, being nine feet two inches, and even in May of that year the comparatively large total of two feet four inches is recorded. It is easily seen from the foregoing that the accumulations at the higher levels must be very great, and as the sides of the mountains are nowhere near the angle of repose for snow, very little is required to start a destroying avalanche. In the spring, as the snow may weigh nearly fifty pounds per cubic foot, the tremendous force of one of these slides can be imagined. It is necessary, at the worst points, to protect the tracks from the effects of such slides. When they can be made to pass under the tracks, it is done; but such measures are unreliable at best, as a slide is never as large as it may be sometime in the future. The usual way is to cover the track by a shed at dangerous points. The sheds are of five general types: If the surface slopes at a steep angle, the uphill side is held by a retaining crib of cedar logs. The shed rafters are supported at one end by this crib, and the other end is carried by a framed bent, the middle of the rafter being supported by struts. As a rule, the bents are five feet apart between centres, but at points where unusually severe slides may be expected, this distance is reduced to four. Shed rafters are usually twelve by fifteen inch, of Douglas fir, the plumb and batter posts being twelve by twelve. The bents are supported either by piles or mud sills.

The second type comes in when the slope is flatter; in this case, the crib is only carried up half way, and a framework of posts and rafters built on top.

The third case is where the crib is omitted altogether; and, in a fourth, known as the valley type, the cribs are built on both sides and the rafters laid directly across; the latter type being used where slides may be expected from either side.

The fifth type is used in deep side-hill rock cuts or places where the slide must fall nearly vertically on the shed. In this case, the rafters are in effect trussed, and the sheds more strongly built than usual.

As a shed is a valuable structure and, from its use, subject to fire, extensive measures to prevent it have been taken. A complete system of piping extends throughout the shed and, moreover, the shed itself is broken into short lengths separated by fire breaks. These breaks are covered by split fences, which consist of heavy V shaped cribs, to guide the slide over the adjacent sheds. A system of patrol is kept

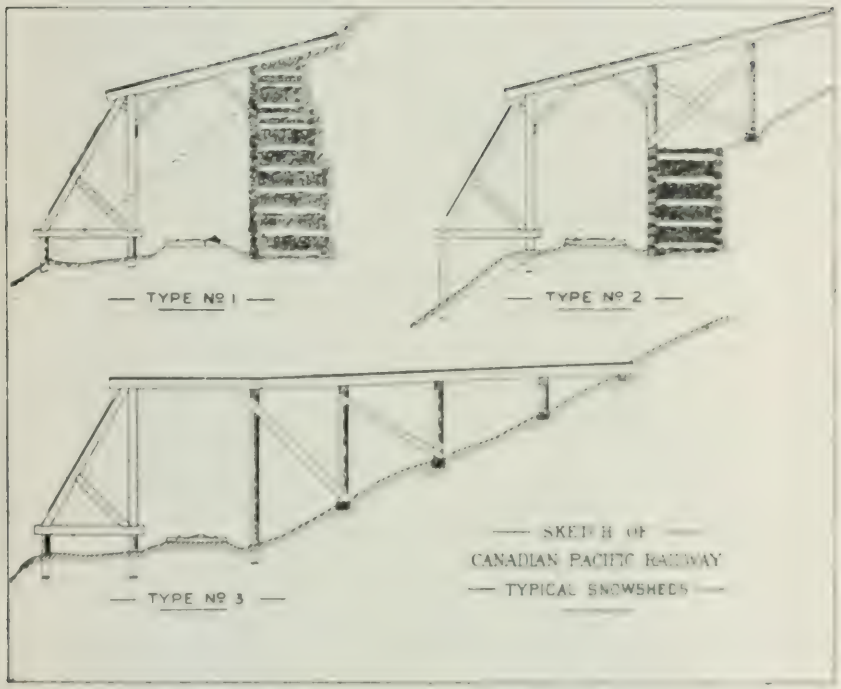
Interior of a Snow Shed.

up all year round, and, in case of fire, the watchmen can be on the spot almost at once.

The first shed is located about six miles east of the summit, and the last at Three Valley lake, fifteen miles west of Revelstoke. Between these two points some fifty-four sheds were built, aggregating over six miles, and averaging about forty dollars a foot in cost. Some of the sheds have been done away with by improving the line, but the total length is still over six miles.

The summit of the pass is reached a mile west of Rogers Pass station, 4,350 feet above tidewater. The descent on the west side is of a very different character from the climb up the east slope. The Beaver river, for the greater part of its length, is a sluggish, crooked stream occupying a very broad, open valley not much obstructed by canyons or remains of glacial action. The Illecillewaet, which forms the western side of the pass, is anything but sluggish, and its course is continually through deep canyons and over ancient terminal moraines. The railway on the west side of the pass has to fight for a footing all the way down from the summit. Once the level of the valley is reached, at the foot of the Loop, the line is never very far above the river. The grades are the same as on the east side, but they are not continuous, and the line is of a different character altogether. To begin with, it gets down to the level of the valley, at once, by means of a double loop. Leaving the summit, the line curves off to the left and then swings back, passing close to the forefoot of the great Illecillewaet glacier in its course. A mile and a half further down, the road makes a double loop, in the shape of the letter S inverted. By this loop the road falls to the level of the stream more quickly than it otherwise would. The stream is reached four miles from the summit in a direct line, but it is nine and a half by the track. To bring the track down, as was first proposed, on the north side of the valley would have necessitated heavier grades and some very high bridges. As it is, the bridges are never higher than seventy-five feet. At the foot of the loop, the grade eases up for a mile or two over the Ross peak flats, then again resumes the rate of 2.2 per cent. The line now follows the river through an immense terminal moraine, then on down the valley, crossing the river again and again, past Illecillewaet station and through several deep canyons, of which one of the most striking, Albert canyon, is 175 feet deep. Some tunnels were necessary on this portion of the line, one, in gravel, being 600 feet or more in length. At Albert canyon the end of the heavy grade is reached and the next twenty miles to Revelstoke are comparatively easy, offering few problems of any difficulty to the engineers. The Columbia is crossed at Revelstoke and the road reaches the head waters of the Fraser by the Eagle pass. This pass is only about five hundred feet above the Columbia and the ascent does not show much difficulty. To the engineer making a trip over the Selkirks, the main features will no doubt be the snow-sheds and

the Loop. He will not find any sheds 40 miles long, as on roads very much farther south, neither will he see any double circles or switchbacks, as on some other lines over the mountains, but he will find much of general interest to the man who does not make a specialty of such things. Moreover, the scenery along this seventy miles will surpass anything he is likely to see again. It has been said that the Canadian Rockies contain much of Switzerland and portions of the Andes and the Himalayas, and, in addition, something quite distinctly their own. From one point the traveller can count forty-two glaciers without leaving the car, and, if he cares to go farther afield, would have no great difficulty in exploring them. If he cares for hunting, he can get it within easy reach of the track, and nowhere in the world are the trout more lively or better eating. If he be an artist, he has a range of subjects to keep him busy the rest of his days, and no place on earth can offer greater attractions to the alpine climber. All are certain to leave the Selkirks with regret and a resolve to revisit them upon the first opportunity.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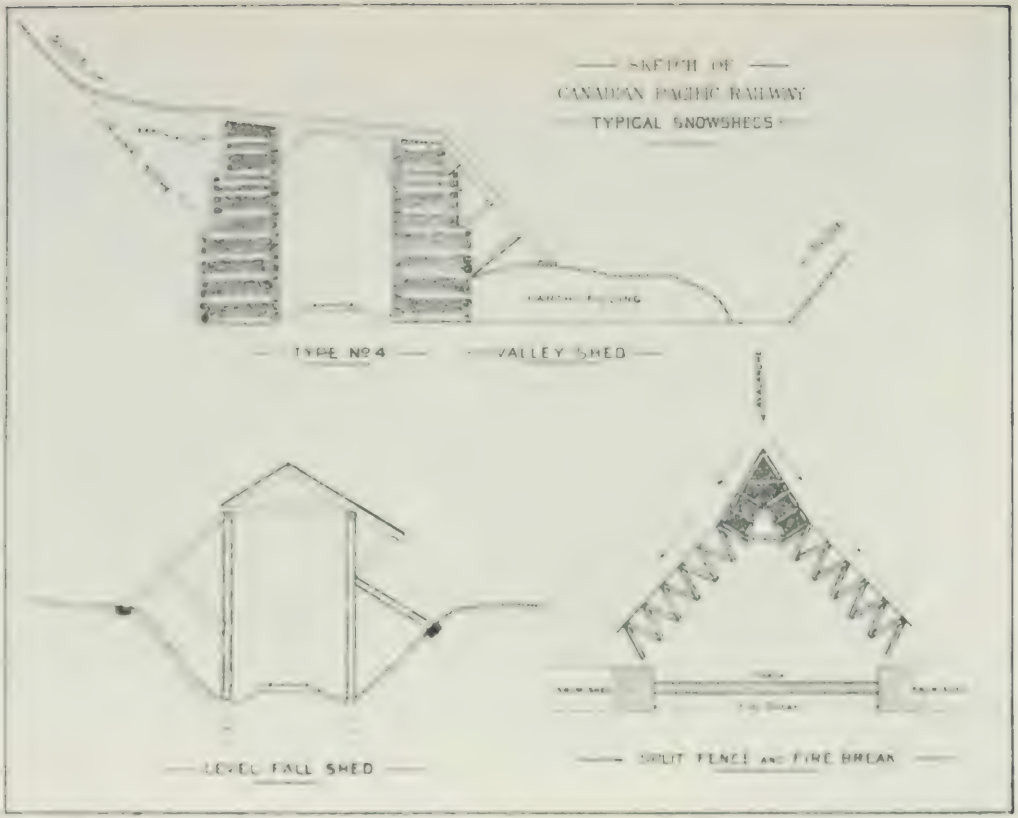
— SKETCH OF —
CANADIAN PACIFIC RAILWAY
— TYPICAL SNOWSHEDS —


SKETCH OF
CANADIAN PACIFIC RAILWAY
TYPICAL SNOWSHEDS
TYPE No 4
VALLEY SHED
LEVEL FALL SHED
SPLIT FENCE and FIRE BREAK

APPENDIX G.

CHAPTER 84.

AN ACT TO PRESERVE THE FORESTS FROM DESTRUCTION BY FIRE.

Her Majesty, by and with the advice and consent of the Legislative Assembly of the Province of British Columbia, enacts as follows:—

Short Title.

1. This Act may be cited as the 'Bush Fire Act.' 1896, c. 21, s. 16.

Fire Districts.

2. The Lieutenant-Governor in Council may, from time to time, by Order in Council, constitute any portion of the Province of British Columbia a fire district. Any Order in Council made in pursuance of the power hereby granted shall be proclaimed by being published in at least two successive issues of the British Columbia *Gazette*, and such part or portion of the Province as is mentioned and defined in any such Order in Council shall, after the said publication, become a fire district within the meaning and for the purposes of this Act. 1896, c. 21, s. 1.

3. The Lieutenant-Governor in Council may, from time to time, by Order in Council, revoke any Order in Council made under the power conferred by the preceding section, and such revocation shall be proclaimed in at least two successive issues of the British Columbia *Gazette*. 1896, c. 21, s. 2.

Regulation of Fires in Fire Districts.

4. It shall not be lawful for any person to set out, or cause to be set out or started, any fire in or near the woods, within any fire district, between the first day of May and the first day of October in any year, except for the purpose of clearing land, cooking, obtaining warmth, or for some industrial purpose: and in cases of starting fires for any of the above purposes, the obligations and precautions imposed by the following sections shall be observed. 1896, c. 21, s. 3.

5. It shall not be lawful for any person to set out or cause to be set out or started, between the said first day of May and the first day of October in each year, within any fire district, any fire for the purpose of clearing land, unless the trees and undergrowth on such land shall have been first cut down and a space cleared around the margin or outer edge of the land which is to be cleared by fire, of sufficient width

to prevent the fire from spreading and burning up the timber and forests adjoining or surrounding the land which is to be cleared by fire. The owner of any land on which fire shall be so made or started for the purpose of clearing the same, shall, by himself or his servants, constantly watch over, manage, and care for such fire, and observe every reasonable care and precaution to prevent such fire spreading as aforesaid. 1896, c. 21, s. 4.

5. Every person who shall, between the said first day of May and the first day of October in any year, make or start within any fire district, any fire in any woods or forest, or upon any lands adjacent thereto, for cooking, obtaining warmth, or for any industrial purpose, shall clear a sufficient space surrounding the place in which he is about to light or start such fire, and shall completely extinguish such fire before leaving the place. 1896, c. 21, s. 5.

Equipment of Locomotive Engines in Fire Districts.

7. All locomotive engines used on any railway which passes through any fire district, or part of a fire district, shall, by the Company using the same, be provided with, and have in use, all the most approved and efficient means used to prevent the escape of fire from the furnaces or ash-pans of such locomotive engines, and the smoke-stack of each locomotive engine so used shall be provided with a *lonnet* or screen of iron or steel wire netting, the size of the wire used in making the netting to be not less than number nineteen of the Birmingham wire gauge, or three sixty-fourth parts of an inch in diameter, and shall contain in each inch square at least eleven wires each way at right angles to each other, that is in all twenty-two wires to the square inch. 1896, c. 21, s. 6.

8. It shall be the duty of every engine-driver in charge of a locomotive engine passing over a railway within the limits of any fire district to see that all such appliances as are above mentioned are properly used and applied, so as to prevent the unnecessary escape of fire from any such engine, so far as it is reasonably possible to do so. 1896, c. 21, s. 7.

Penalties.

9. Whosoever unlawfully neglects or refuses to comply with the requirements of this Act, in any manner whatsoever, shall be liable, upon summary conviction before a Justice of the Peace, to a penalty not exceeding fifty dollars; and any railway company permitting a locomotive engine to be run in violation of the provisions of section 7 of this Act, shall be liable to a penalty of one hundred dollars for each offence, to be recovered with costs in any Court of competent jurisdiction. 1896, c. 21, s. 8.

10. All fines and penalties imposed and collected under this Act shall be paid one-half to the prosecutor and the other half to Her Majesty, for the public use of the Province. 1896, c. 21, s. 9.

Limitation of Actions.

11. Every action for any contravention of this Act shall be commenced within the space of three months immediately following such contravention, and not afterwards. 1896, c. 21, s. 10.

Evidence.

12. In any prosecution or action brought against any person or body corporate for any contravention of this Act, the burthen of proving that the requirements and provisions of this Act have been complied with shall be upon the defendant or defendants in such prosecution or action. 1896, c. 21, s. 11.

Civil Rights Preserved.

13. Nothing in this Act contained shall be held to limit or interfere with the right of any person to bring and maintain a civil action for damages occasioned by fire. 1896, c. 21, s. 12.

Duties of Government Officials.

14. It shall be the special duty of every Government Agent, Gold Commissioner, Timber Inspector, Forest Ranger, Mining Recorder, and Provincial Police Officer or Constable to enforce the provisions and requirements of this Act, and in all cases coming within the knowledge of any such official, officer or constable, to prosecute every person or body corporate by whom there is reasonable cause for believing any contravention of this Act has been committed. 1896, c. 21, s. 13.

15. Every pre-emptor, purchaser, or lessee of Crown lands shall, at the time of the entry of his pre-emption, or of his application to purchase or lease, be furnished with a copy of this Act. 1896, c. 21, s. 14.

APPENDIX H.

BRITISH COLUMBIA GAME PROTECTION ACT, 1898.

For ready reference and convenience the following is a synopsis of the Game and Fish Protection Act.

(Statutes 16, Statutes E.)

Species of Birds, Animals, &c.	Unlawful to shoot or destroy during the close season as stated below (dates inclusive)	Unlawful to buy, sell or expose for sale, show or advertisement.	Unlawful to Kill or Take.
Beaver	April 1 to November 1		
Birds living on ocean (except	At any time.	At any time.	
Bittern	March 1 to August 31.		
Blue-fish (Anglice)	At any time.		
Caribou	January 1 to August 31.	Before October 1	More than five in one season.
" (cow or calf)	At any time.	At any time.	
Chaffinch			
Deer (fawn under twelve months			
" (buck)	December 15 to August 31	Before September 1	More than two in one season or three with
" (doe)		At any time.	dogs or kill for hides alone.
Ducks of all kinds	March 1 to August 31.	During close season.	More than 200 in one season.
Elk (Wapiti (male)	January 1 to August 31	At any time.	More than two in one season.
" (cow)	At any time.		
" calf under two years.			
Grouse and birds (including Prairie	January 1 to August 31	At any time, except 12 ptarmigan which may be sold during season.	
Pheasants			
Quail	At any time.	At any time.	
Rail	January 1 to August 31	Before October 1	
Snipe	March 1 to August 31	During close season	
Swan (white)	April 1 to November 1		
Swan (black)	At any time.	At any time.	
Sparrow	April 1 to November 1		
Shorebirds (only	March 1 to August 31.	At any time.	
Woodcock (male	January 1 to August 31	Before October 1	More than two in one season.
" (cow, and calf under two	At any time.	At any time.	
months)			

Mountain goat	December 15 to August 31	Before October 1	More than five in one season
Mountain sheep (ram)			More than three in one season.
" (ewe or lamb)	At any time	At any time	
Partridge (English)			
Pheasant (cock)			
" (hen)			
Plover	March 1 to August 31	During close season	
Quail (of all kinds)	At any time	At any time	
Rabbit	Farmers only may shoot in gardens between June 1 and September 1		
Sagehen	At any time		
Thrush			
Eggs of protected birds			To take or destroy at any time

NOTE.—It is unlawful—

(1.) To enter land enclosed by fence, water or natural boundary, for hunting purposes after notification or if sign is exposed stating "Hunting or shooting on these lands forbidden under British Columbia Game Laws." Section 17.

(2.) For non-residents to shoot without a license. Section 14.

(3.) For Indians, not residents of this Province, to kill game at any time of the year. Section 12 (4).

(4.) To export, and to transport for export by railway, steamship or express, to the United States, game birds of every kind, and also all animals protected by the Act except bear, beaver, marten and land otter. Section 4.

(5.) To use trap, pole, snares, gun, baited line or dropped hair to catch game birds. Section 6.

(6.) To expose for sale any deer without its head on, or any game bird without its plumage. Section 9 (d).

(7.) To use batteries, swivel guns or punts to use bird shot to take wild ducks or geese. Section 9 (c).

(8.) To shoot any wild fowl in Victoria and Vancouver Harbours. Section 5.

(9.) For unlicensed persons to trap or kill bear or beaver for their pelts. Section 7.

(10.) To kill any game bird between one hour after sunset and one hour before sunrise. Section 9 (a).

(11.) To kill game birds or animals imported for acclimatization purposes. Section 3.

(12.) To use or sell heads of mountain sheep. Section 9 (b).

(13.) To take trout by any other device than hook or line. No salmon may be so taken. Section 8.

*Farmers may kill deer destroying fields, or on unenclosed tracts by foot. Section 11.

*Non-residents have right to kill game for five days only. Section 12.

*Lieutenant-Governor-in-Council may, by Proclamation, remove disabilities. Section 14.

PROVINCIAL POLICE DEPARTMENT,
VICTORIA, B.C., August 16, 1909.

F. S. HUSSEY,
Superintendent.

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